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THE MONOGRAPH OF
CHINESE FERNS

Being A Systematic Treatment of All Ferns
Known Hitherto in China.

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by

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Preface

A little over five years have been elapsed since the writer began the undertaking of the studies of ferns indigenous in China. The present monography, being a systematic treatment of all the species of ferns known hitherto in this country, is a consolidated result of his studies during that period of time. In spite of the errors or defects which many be overlooked by the writer, the present work is, in fact, the first of its kind ever produced in this country, and it is hoped that it will at least serve two purposes: to furnish the botanists in China a systematic presentation of the most up-to-date and complete informations bearing on our fern flora, and to provide a fairly solid foundation for further research in the pteridophtic field in China.

Dr. Matthew's Enumeration of Chinese Ferns,* the only work on Chinese ferns in a condensed form up to the end of last two decades, have been far out of date, because of the fact that a good many species listed have been in the late years reduced to varieties or mere synonyms of some other described forms and that a considerable number of new ones has been added to our fern flora since the publication of his work. Nor his list would have proved a much help to one interested in the review work on Chinese flora, as no informations other than the indication of general localities for each species were given.

Although the literatures on Chinese ferns are rather extensive, yet they are like those of our phanerogamous plants not only very fragmentary in nature but also mostly widely scattered in numerous publications throughout the world, of which some being of a obscure nature are totally unknown to the botanists in China. Some earlier works by European writers were out of print long ago and are now found only in the libraries of old botanical institutions in Europe and America. In this connection, the writer wish to express his sincere thanks to Dr. Wm. Maxon, Associate Curator of the United States National Herbarium, Washington, and to Dr. E. D. Merrill, Director of the New York Botanical Garden for their courtesies in securing for him photostat copies of some earlier works on Chinese ferns by H. Christ, to Dr. Carl Christensen, Curator of the Universitetets botaniske Museum, Copenhagen, for sending to the writer from time to time some of the reprints by late Dr. Hieronymus and others, and to Dr. E. B. Copeland for his many papers on oriental ferns. In particular, the writer has been greatly indebted to Mr. H. Green, Superindent of the Forestry and Botanical Department, Hongkong, for his courtesy in placing at his disposal the full library and herbarium facilities of the Department.

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*) Journal of Linnean Society XXXIX, 339 (1191), London.

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Phyllum 3. PTERIDOPHYTA
Ferns and Fern-allies

Mostly green plants having leaf-bearing shoots, true roots and woody and vascular tissues. They produce spores asexually, each of which, on germination, develops into a prothallium or a small thalloid body (gametophyte). The prothallia bear the reproductive organs; the female organ is know as an archegone, the male as an antherid. As a result of the fertilization of an egg in the archegone by a motile spermatozoid produced in the antherid, the asexual state of the plant is developed (sporophyte); this plant is represented by and popularly known as a fern, a lycopod, or a quillwort. Not less than 9000 species of living ferns and fern-allies are known. Several thousand fosil species have been discovered; a great majority of the living forms grow naturally in tropical regions, About 1500 species are known recently to occur in China, especially in her southern provinces.

17 families, containing approximately 9000 extant species all over the world.

Key to the Orders of Pteridophyta

1. Leaves more strongly developed than the stems, with broad or narrow, entire or toothed or dissected blades --- Fern-like plants

    2. Plants homosporous

        3. Vernation straight or inclined; prothallium tuberous, yellowish or white, subterranean...Order I.
        Ophioglossales

        3. Vernation circinate; prothallium flat or filiform, entire or variously incised or branched, terrestrial or epiphytic, green.

            4. Sporangia without a ring, separate or coalescent and forming thick circular or oblong to linear 2 close-rowed synangia, opening by vertical pores or longitudinal slits...........Order II.
            Marattiales

            4. Sporangia with a complete or incomplete ring, consisting of a close or open row, or a group of thickened cells, not arranged in synangia.Order III.
            Filicales

    2. Plants heterosporous; the spores borne in ovoid conceptacles...............................Order IV.
    Salviniales

1. Leaves none or much less developed than stems and then scale-like or subulate --- ruch-like plants or moss-like plants

2. Stems leafless, elongated, hollow, conspicuously jointed, their nodes encircled tubular toothed sheaths; sporangia borne on the under side metamophosed scale-like peltate sporophylla forming terminal dry cone-like spikes (not treated in this work)...........Order V.
Esquisetales

2. Stems leafy, elongate or tuberous, solid, without conspicuous sheathed joints; sporangia solotary, borne at the base of ordinary or slightly mordified green leaves on the upper side, superficial or imbedded.

   3. Leaves scale-like, flat, crowded or imbricate, borne on erect or creeping elongate stems; sporangia superficial, spores uniform or dimorphous; plants terrestrial or epiphytic (not treated in this work).. ....Order VI.
   Lycopodiales

   3. Leaves long-subulate, borne in a rosette on a short corm-like caudex; sporangia imbedded in a pit at the dilated base of the sprophylla, spore dimorphous; plants aquatic (not treated in this work)........... ....Order VII.
   Isoetales

Key to the Families treated in this work

1. Sporangia derived from a group of cells; wall more than 1 cell thick (*Eusporangiatae*).

   2. Fronds erect or inclined in vernation; sporangia solitary, paniculate or spicate; the sterile segments usually appearing lateral..................Fam. I. *Ophioglossaceae*

   2. Fronds circinate in vernation; sporangia in sori, dorsal on the normal fronds........Fam. II. *Marattiaceae*

1. Sporangia derived from a single cell; wall 1 cell thick (*Leptosporangiatae*).

   2. Spores of one kind; plants mostly terrestrial, except 4 (*Eufilicineae*).

      3. Leaf-tissue usually 1 cell thick, without stomata, usually without parenchyma............................ ....Fam. III. *Hymenophyllaceae*

      3. Leaf-tissue several to many cells thick with both stomata and parenchyma.

         4. Sporangia opening by a more or less transverse slit

5. Ferns arborescent........Fam. IV. *Cyatheaceae*
5. Ferns not arborescent.
   6. Terrestrial plants; annulus longitudinal.... ....Fam. V. *Polypodiaceae*
   6. Aquatic plants; annulus oblique.............. ....Fam. VI. *Parkeriaceae*

4. Sporangia opening by a longitudinal slit.
   5. Annulus medial, more or less surrounding the sporangia like a belt...Fam. VII. *Gleicheniaceae*
   5. Annulus subapical........Fam. VIII. *Schizaeaceae*
   5. Annulus rudimentary......Fam. IX. *Osmundaceae*

2. Spores of two kinds; aquatic plants (*Hydropterideae*)
   3. Plants free-floating; leaves small, entire and simple or finely dissected...........Fam. X. *Salviniaceae*
   3. Plants rooting in mud; leaves cruciform............... ....Fam. XI. *Marsiliaceae*

COMPENDIUM

of

ORDERS, FAMILIES, TRIBES AND GENERA AS FOLLOWED IN THIS WORK

Order I. *Ophioglossales.* Prothallium tuberous, white; vernation straight or inclined. Sporangia without a ring, on modified contracted segments in panicles or spikes.

Family I. *Ophioglossaceae.* Sporangia without a complete ring, sessile, placed on much contracted, spicate or paniculate fertile segments opposite to and springing from the base, the centres or the margin of the normal frondose barren segment; indusium wanting.

Genus 1. *Ophioglossum.* Fertile segments spicate, with the sporangia in 2 opposite, lateral rows; barren segments simple; veins anastomosing.

Genus 2. Helminthostachys. Fertile segments spicate, with the sporangia in numerous crested clusters spreading in all directions; barren segments once divided; veins free.

Genus 3. Botrychium. Fertile segments paniculate, with the sporangia placed in 2 rows on the inner face of the branches; barren segments compoundly divided; veins free.

Order II. Marattiales. Sporangia without a ring, arranged in synangia dorsal on the normal leaves; prothallum flat or filiform, entire or branched, green; vernation circinate.

Family II. Marattiaceae. Sori on the under surface of normal fronds, round or oblong or linear, sori consisting of more or less 6-100 or more free or connected capsule, placed in a whorl or in 2 close rows; inducium wanting or minute in the form of inconspicuous inferior scales. Fronds uniform, mostly large, the stipes flanked by 2 stipuleform appendages at the base.

Genus 4. Angiopteris. Sori mostly short, elliptical, consisting of a few to 20 sporangia, quite near the margin; paraphyses in the inducium much shorter than, and borne sporangia. Fronds 2 or more pinnate, with "recurrent veinlets" running from the margin towards costa between the soriferous veinlets.

Genus 5. Archangiopteris. Sori linear, consisting of 80-160 sporangia, placed almost midway between the margin and costa; paraphyses dense well protruding from under and between the sporangia. Fronds simple pinnate, without recurrent veinlets.

Order III. Filicales. Spores of one kind (Eufilicineae). Terrestrial ferns (except only family). Sporangia with a complete or incomplete ring, not arranged in synangia, dorsal on normal leaves.

Family III. Hymenophyllaceae. Ring complete, more or less horizontal, surrounding the compressed sporangium like a belt; sori terminal on the veins; inducium present.

Genus 6. Hymenophyllum. Inducium more or less deeply 2-valved; surfaces of sporangium divided into many uniform cells.

Genus 7. Trichomanes. Inducium tubular or funnel-shaped, the mouth entire or 2-lipped; surfaces of the sporangium devided into few unequal cells.

Family IV. Cyatheaceae. Rings complete, subvertical; inducium wanting or present, but then neither umbrella-shaped nor linear; caudex arborescent in the full-grown plants.

Tribe I. Cyatheae. Ring not depressed at the place of stomium; sori globose, dorsal on the veins.

Genus 8. Cyathea. Inducium globose, at least when young, at length cup-shaped, entire, laciniate or evanished.

Genus 9. *Alsophila*. Inducium wanting, or consisting of a minute inferior scale or a whorl of hairs or fibres.

Tribe 2. *Dicksonieae*. Ring depressed at the place of the stomium; sori roundish or suboblong, terminal on the veins.

Genus 0. *Dicksonia*. Inducium cuculate, 2-valved, the outer valve consisting of a small lobe of the frond (not known from China).

Genus 10. *Cibotium*. Inducium subcuculate, 2-valved, the outer valve differentiated from the margin of the frond.

Family V. *Polypodiaceae*. Ring incomplete, vertical, the extremities sometimes separated by the stalk of the sporangium only; Sori definite or indefinite, but then closely crowded over the parenchyma (Ring sometimes as in Family 2, but then the sori and inducia linear and the caudex not arborescent).

Tribe 1. *Woodsieae*. Sori roundish; inducium globose, cupuliform or sausage-shaped, fastened all round the receptacle under the sori (inferior).

Genus 11. *Diacalpe*. Sori sessile, inducium globose, bursting down irregularly from the top, receptacle small, scarce elevated; veinlets simple, free.

Genus 12. *Peranema*. Sori as in Diacalpe but enclosed in a stalked inducium, at length irregularly bursted into two halves, receptacle large and sporangia much longer stipitate than in Diacalpe.

Genus 13. *Woodsia*. Sori dorsal seldom terminal in the veinlets, roundish, receptacle slightly elevated; inducium globose to sausage-shaped, its margin more often deeply laciniated, laciniae usually terminated in long hairs, which involve the sporangia or sometimes rudimentary. Mostly small ferns, bi-tripinnatifid, often glandular-hairy; veins simple or forked, free.

Genus 14. *Cystopteris*. Sori roundish, dorsal on the veinlets; inducium almost roundish, cupuliform, membranaceous, inserted by its broad base under the sorus, which at the beginning it covers or partially covers like a hood and at length throws back. Veins forked, free.

Genus 15. *Acrophorus*. Sori termina on the veinlets, not marginal, but in the middle of each tooth; inducium oval, inferior, scarcely covering the sorus,

membranaceous, opening backward from front. Fronds compound, tufted.

Tribe II. *Onocleae*. Like tribe I, but fronds strongly dimorphous, the fertile leaf or segment strongly contracted.

Genus 16. *Matteuccia*. Sori dorsal on the veins of the modified and much-contracted pinnae of the fertile frond and quite concealed by the revolute margin. Fronds stipitate, dimorphous; fertile ones pinnate pinnae torulose or flattish; veins all free, pinnate.

Genus 17. *Onoclea*. Like genus 12, but differs by anastomosing veins, pinnate fertile fronds, and creeping rhizome.

Tribe III. *Oleandreae*. Sori roundish or oblong, uniserial or irregular, dorsal somewhat lateral on the veins, rarely medial, but generally near the costa; indusium reniform articulated to creeping, candent or erect rhizome; vein parallel and compact, forked and free or anastomosing towards margin.

Genus 18 *Oleandra*. Characters of the tribe

Tribe IV. *Aspidieae*. Sori roundish or oblong, indusium (when present) superior, reniform, round or oblong, if reniform attached at the top of a more or less deep sinus, if round peltate or oblong attached by its longitudinal axil, all opening all round the edge or nearly so.

Genus 19. *Dipteris*. Like genus Neocheiropteris, but main veins dichotomously forked, sori small, numerous, irregularly disposed all over the entire under side of the frond, and of large dimensions.

Genus 20. *Neocheiropteris*. Sori large, oblong, borne on thickened receptacle on the costal arches of veins; indusium wanting. Fronds simple, flabellate-lobulate, with sympodial lateral main veins; stipes not articulated to the rhizome.

Genus 21. *Polystichum*. Sori subglobose, dorsal or terminal on the veinlets; indusium orbicular, fixed by the centre. Fronds 1-3-pinnate or decompound; pinnae and pinnules auriculated on the upper side at the base, and much cut away or cuneate on the lower; teeth generally awned, spinulose, mucronate; veins simple or pinnately forked, free; texture generally coriaceous and rigid.

Genus 22. Polybotrya. Sporangia borne only on thickened receptacle along the veins, soon confluent all over the whole under-surface of the much contracted fertile segments. Fronds dimorphous, at least once pinnate; veins free.

Genus 23. Cyclopeltis. Sori round, transverse, biserial; indusium orbicular. Fronds pinnate, pinnae entire, lanceolate, auriculated at the base, articulated with the rachis; veins 2-3-forked, veinlets free, lower interior and exterior ones soriferous, on or below their apices.

Genus 24. Dryopteris. Indusium present or wanting, when present, then reniform, rarely round. Fronds once pinnate to compound, not articulate to rhizome; veins free or the lower veins anastomosing and forming costal rows of regular more or less deltoid areolae.

Genus 25. Cyrtomium. Sori round, transversely uniserial or numerous and oblique-serial. Indusium orbicular. Fronds as in genus 16, but only simply pinnate, rarely simple; veins anastomosing into one or more rows of oblique hexagonal areolae with 2-3 included free soriferous excurrent veinlets producing from their junctions.

Genus 26. Aspidium. Indusium round or reniform, rarely nearly 2 X as long as broad. Fronds simple or divided, not articulated to the rhizome; veins anastomosing copiously, included free veinlets wanting or present, but then not as in genus 17., if excurrent than solitary in the areolae.

Tribe VI. Davallieae. Sori roundish, oblong or linear, if roundish or longitudinally elongated then solitary and terminal on the veins, if 2 or more veinlets. Indusium present rarely wanting, more or less of the same shape, attached at the inner side of the sorus, opening outwardly at the apex, fastened broadly at the base, attached or free at the sides.

Genus 27. Lindsaya. Sori roundish, transversally oblong or linear, submarginal. Fronds of rather soft texture, pinnae or pinnules dimidiate, i. e. the half on the lower side of the midrib cut away; veins free, forked or flabellate.

Genus 28. Schizoloma. Like genus Lindsaya, but pinnae or pinnules not dimidiate; veins more or less anastomosing.

Genus 29. Arthropteris. Sori terminal, round; indusium re-

niform or absent. Fronds simple pinnate with stipes pseudo-articulate to slender wiry scandent rhizome; pinnae articulate to rachis; veins forked or pinnate with free clavate veinlets.

Genus 30. *Nephrolepis*. Like genus 18, but rhizome short, tufted, erect and stoloniferous, fronds not articulated to rhizome. Sori terminal, round, submarginal, uniserial, and conniving with the soriferous crenule, forming a marginal bilabiate cyst as in 31.

Genus 31. *Humata*. Sori roundish or globose, intra- or submarginal; inducium coriaceous, suborbicular or reniform, attached by a broad base, the apex and sides free. Fronds articulated to the rhizome, scattered, coriaceous, deltoid, simple or divided; veins always free; rhizome creeping, scaly, scales not minute not fibril-like.

Genus 32. *Davallia*. Like genus Humata, but roundish or longitudinally elongated submarginal inducium attached at the base and sides with the apex free.

Genus 33. *Odontosoria*. Sori roundish or transversally oblong, terminal on the cuneate ultimate segments; inducium marginal, vertical, urceolate or, by confluence, oblong. Fronds 2-3-pinnate; veins dichotomously forked; veinlets free.

Genus 34. *Microlepia*. Sori roundish, submarginal or intramargin, inducium as in genus Davallia, but membranaceous. Fronds divided, not articulated to the rhizome. Rhizome hairy or fibrillose. Ultimate segments unequal sided at the base.

Genus 35. *Dennstaedtia*. Like 34, but sori roundish, inducium cup-shaped, indistinctly two-valved with the -outer valve distinct from the marginal substance of the frond. Stipes not articulate.

Genus 36. *Monachosorum*. Differs from all genera of the tribe by exinduciate sori attached to thickened apices of the veins, ended in the middle of teeth. Frond 2-3-pinnate, of thin texture; rhizome creeping, hairy.

Tribe V. *Pterideae*. Sori roundish, oblong or linear, if roundish or longitudinally elongated then solitary and terminal on the veins, but not rarely laterally confluent into a marginal line, if transversally oblong or linear then uniting the apex of several veinlets. Inducium more or less of the same shape, marginal, i. e. consisting of the reflexed, mordified margin of the frond

open inwardly.

Genus 37. Adiantum. Differs from the following genera by the inducium bearing the sporangia on its inner surface. Fronds simple, pinnate to decompound with polished eboneous wiry stipes; pinnae or pinnules often halved.

Genus 38. Hypolepis. Sori roundish, distant, confined to the tops of sinuses, 1 to each sinus; inducium roundish, small, hardly covering the sorus at fully maturity.

Genus 39. Plagiogyria. Sori as in genus Cheilanthes; inducium linear. Vein tips not or hardly thickened. Stipes usually trigonous and abruptly thickened at the base and generally purveyed there with more or less 2-12 spongy glands or tubercles on the outer sides. Fronds dimorphous, pinnate; the fertile segments contracted, narrowly linear.

Genus 40. Cryptogramma. Like genus Onychum in sori and inducium, but veins free, forked, a considerable way short from the margin of frond; receptacles terminal, subelongated; sori defined, terminal on the tips of free veinlets oblong, becoming laterally confluent, forming a compound, broad, intramarginal, linear sori, including under the universal inducium formed of membranaceous revolute conniving margin of frond.

Genus 41. Cheilanthes. Sori roundish or oblong, solitary and terminal on the veins, soon confluent into a submarginal line; inducium roundish, transversally oblong or linear. Vein tips thickened. Stipes not as in genus Plagiogyria.

Genus 43. Pellaea. Like 41, but differs by continuous inducium, from 47 it distinguished by its habit. Fronds divided, the pinnae or pinnules more or stalked, articulated the base.

Genus 41. Doryopteris. Sori and inducia as in ~~//~~ genus Pellaea. Fronds simple or incised, the segments adnate, confluent not articulate at the base. Veins free or anastomosing.

Genus 45. Histiopteris. Sori and inducium oblong or linear. Fronds compoundly divided; lowest pinnules short, close to the main rachis, stipule-like; leaflets not articulate at the base.

Genus 46. Onychum: Sori and inducia as in 45. Fronds finely dissected; ultimate segments narrow with the sori and inducia (which are occupying both sides of the segments) reaching nearly or quite to the midrib; leaflets not articulate at the base. Spores globose to tetrahedral. Veins in the fertile segments simple, short, their apices transversely combined by the receptacle; sori linear, in the axis of a linear slightly intramarginal inducium.

Genus 47. Pteris. Like 46, but the fronds not finely dissected, the ultimate segments broader with the sori and inducia not reaching the midrib. Stipes with a single V- or U- shaped vascular strand.

Genus 48. Pteridium. Like 47, but the inner valve of the inducium sometimes obsolete; the spores as in 46. Stipes with many, irregularly placed vascular strands.

Tribe VII. Blechneae. Differs from tribe Asplenieae by sori and inducia attached to a costal row or areolae, parallel with and close to costa inducium of the same shape as the sorus attached at the outer side of the sorus, opening inwardly.

Genus 49. Brainea. Differs from 51, by thick aborescent caudex to 4 feet high, by linear exinduciate sori usually sitting on the veins which are united at lower part so as to form a costal row of oblique, cuneiform areolae along the midrib.

Genus 50. Stenochlaena. Rhizome elongated, scandent. Fronds dimorphous, pinnate; the fertile contracted, pinnae articulated to the rachis; veins simple or forked, rarely two separated veinsanastomosing; fertile segments linear, rachiform, margin membranaceous, revolute, induciform.

Genus 51. Blechnum. Sori long, linear, parallel with and and more or less contiguous to the midrib; inducium membranaceous, distinct from the edge of frond. Fronds uniform or dimorphous, generally pinnate or pinnatifid; veins free.

Genus 52. Woodwardia. Rhizome short, thick, erect not scandent nor aborescent; fronds uniform. Sori linear or linear-oblong, sunk in cavities of the frond, in single rows parallel with and contiguous to the midrib; inducium subcoriaceous, closing over the cavity like a lid; veins form a series of costal areolae the rest free or anastomosing.

Tribe VIII. Asplenieae. Sori oblong or linear, attached to the sides of the veins, which unite the midribs or main veins with the margin, therefore, most oblique to the midribs, rarely placed between the veins; Inducia of the shape, springing the veins on the same side as the Sori.

Genus 53. Arthyrium. Like 54, but sori short, oblong, the higher never, the lower rarely double, but not rarely hippocrepiform, hamato-recurvate or subreniform; veins free.

Genus 54. Diplazium. Stipes with 2 more or less flattened vascular strands mostly uniting towards the apex of the stipe into a single diarchous one ( ). Sori linear or linear-oblong, the lower of each group of veins mostly double; vein mostly free, sometimes anastomosing.

Genus 55. Diplaziopsis. Like Diplazium with anastomosing veins, but sporangiferous receptacles unilateral on the lower part of the veins; inducium vaulted, cylindrical, forming linear sori, bursting down irregularly. Fronds simply pinnate, texture membranaceous.

Genus 56. Phyllitis. Like 58, but the sori and inducia in opposite pairs, the inducia of each pair opening towards one another; veins free or anastomosing towards the margin.

Genus 57. Camptosorus. Habit of 56, but veins angularly anastomosing near the bases; sori short, linear or oblong, irregularly scattered on either side of reticulated veins or sometimes crossing them partly parallel to the midrib and partly oblique to it, the outer ones more or less approximate in pairs. Fronds elongated and rooting at the apices.

Genus 58. Asplenium. Stipes with 1, or 2 more or less concave vascular strands mostly uniting towards the apex of the stipe into a single tetrarchuous on ( ). Sori and inducia not in pairs; inducia obliquely opening towards the midribs, occasionly towards the margin; veins free, rarely anastomosing.

Tribe [illegible]. Polypodieae. Sori round, oblong or linear, then either parallel or oblique to costa and margin. Fronds articulated to the rhizome.

Genus 59. Drymoglossum. Differs from the following genera by the presence of stellate hairs on the surfaces of leaves and sporangia mixed with stellate or branched hairs. Leaves dimorphous.

Genus 60. Hymenolepis. Leaves uniform, mostly lanceolate, with a strongly contracted apical fertile spike, below which is suddenly broadened sterile portion. Coenosori commonly covering the entire contracted apical portion.

Genus 61. Drymotaenium. Like 69 in habit. Leaves uniform, linear coriaceous, not distinct main veins, coenosori linear, immersed or covered by the strongly revolute edge. Veins hidden, anastomosing.

Genus 63. Myuropteris. Sori without scales and paraphyses leaves dimorphous, the fertile ones very contractedly linear; sterile leaves rather thin, all areolae with a free veinlet that runs towards the midrib.

Genus 64. Cyclophorus. Sori round or oblong, several to numerous. Fronds as in genus Polypodium, but simple, entire, rarely lobate; at least, the under surface always more or less hairy, the hairs stellately branched.

Genus 65. (P. 10). Drynaria. Sori round, many or numerous. Fronds dimorphous; barren fronds oakleaf-like, sessile, humus-collecting, usually, dry, brown, thickly coriaceous; fertile fronds pinnatifid or pinnate, or pinnate, stipitate.

Genus 66. Polypodium. Sori round, oblong or linear, several to numerous on each side, the oblong ones parallel or oblong to the costa, the linear ones oblique, fronds uniform or dimorphous, simple or divided, the barren ones never oakleaf-like; surfaces naked, scaly or hairy, if hairy the hairs not stellately branched.

Genus 67. Lemmaphyllum. Leaves dimorphous or uniform, no main veins present. Like the following genera, no simple or branched hairs present on the sides of leaves; sporangia mixed with peltate umbrella-shaped fuscous deciduous scales.

Tribe X. Cochlidieae. Like the tribe XI in general habit, but rhizome erect, containing sclerenchyma, clothed with light brown (rarely dark-brown) scales, which are not reticulate and generally hidden between the leaf-bases; leaves densely tufted and when old of woody texture with spicule cells; sori without paraphyses, and sporangia with 8 stomium-cells only.

Genus 67. Scleroglossum. Sori long, linear, deeply immersed in submarginal grooves, protected by the much produced costal parenchyma, which is sometimes as broad as the lamina; paraphyses wanting.

Tribe XI. *Vittarieae*. Sori marginal or intramarginal, linear, short or long, 1 on each side of the costa, parallel to the latter or the margin. Fronds mostly simple and entire, not articulated to the rhizome.

Genus 68. *Monogramma*. Sori costal, often protected by a lateral, raised outgrowth of leaf-tissue; lateral veins mostly wanting.

Genus 69. *Vittaria*. Sori deeply (at least at first) immersed in marginal or submarginal grooves; lateral veins present, free.

Tribe XII. *Gymnogrammeae*. Sori linear or linear-oblong, generally more than 2 X as long as broad, several on each side of costae, mostly oblique rarely subparallel to the latter and the margin, free or reticulate; indusium wanting. Fronds not articulated to the rhizome.

Genus 70. *Loxogramme*. Habit and venation similar to 71 but indistinct areolae much shorter and oblique to the distinct costa; sori parallel, regular not reticulated, oblique to the costa and margin.

Genus 71. *Antrophyum*. Differs from the above genera by simple fronds of more or less carnoso-herbaceous texture; copiously anastomosing veins, forming vertical elongate areolae with distinct costa only present only in the lower half of~~f~~ the frond. Sori longitudinal, running along the reticulated veins, irregular, more or less immersed in grooves.

Genus 72. *Ceropteris*. Veins free quite to the margin. Under surface of the fronds white or yellowish-powdery.

Genus 73. *Anogramma*. Like the 74, differs by entire plants being naked.

Genus 74. *Gymnogramme*. Sori borne along the whole length of veinlets without paraphyses. Plants more or less densely scaly. (P. 11).

Genus 75. *Coniogramme*. Veins free or anatomosing into 1-3 rows of areolae before reaching the margin. Under surface green.

Genus 76. *Notholaena*. Veins free; sori round or oblong, terminal, not rarely running into a submarginal line. Fronds densely hairy or fibrillose.

Tribe XIII. *Acrosticheae*. Sori indefinite, i. e. quite covering portion of the under surface of the fertile segments at full maturity. Leaves or

segments strongly dimorphous; the fertile leaves or segments usually much contracted.

Genus 77. Elaphoglossum. Leaves dimorphous; veins free, simple or forked, their apices not rarely united by a more or lessmarginal cartilaginoous or decoloured line. Fronds simple, usually lanceolate; stipes not articulated to the rhizome, but generally pseudo-articulate a little above the base.

Genus 78. Cheiropleuria. Veins anastomosing conspicuously. Fronds dimorphous; the barren ones simple or more commonly bifid; fertile fronds simple, narrowly linear, taller than the sterile.

Genus 79. Acrostichum. Veins anastomosing copiously. Fronds pinnate; pinnae not articulated to the rachis, the higher ones fertile, always much contracted; texture coriaceous. A swampy alkaline---loving fern.

Family VI. Parkeriaceae. Ring incomplete, vertical; sori indefinite, consisting of numerous sporangia scattered irregularly along the few longitudinal veins, covered by the unaltered recurved margin of the frond when young. Aquatic fern.

Genus 80. Ceratopteris. Character of the family.

Family VII. Gleicheniaceae. Ring complete, horizontal, surrounding the sporangia like a belt. Sori roundish, dorsal on the veins; indusium wanting. Fronds rarely unbranched, generally dichotomously forked or pinnate with axillary chaffy buds at the forking; the leafy portion of the branches commonly pectinate; veins always free.

Genus 81. Gleichenia. Characters of the family.

Family VIII. Schizaeaceae. Ring complete, horizontal crowning the apex of the sporangium like an operculum. Sporangia either numerous, arranged in 2-4 regular, close rows in close distichous exindusiate spikes at the apex of fertile fronds or segments, or few (1) placed in the axils of imbricating, clasping indusia, which form spikes along the margin of fertile segments. Fronds very long, twining or small and erect.

Genus 82. Lygodium. Sporangia 1-2, placed in the axils of imbricating, clasping, scale-like indusia, which form spikes either on separate, contracted

segments or in lax rows along the edge of normal segments. Fronds very long, twining, pinnate. Veins free, rarely anastomosing.

Family IX. Osmundaceae. Ring incomplete, short and horizontal or consisting of a lateral group of thickened cells only; indusium wanting. Sori lateral on the margin of much contracted fertile segments or dorsal on the under surface of normal fronds (genus Leptopteris, not Chinese).

Genus 83. Osmunda. Sori globose, placed in opposite marginal clusters, the fertile segments or fronds more or less contracted. Segments articulated to the rachis.

Order IV. Salviniales. Spores of two kinds in distinct sporangia. Aquatic ferns (Hydropteridineae).

Family X. Salviniaceae. Small plants, floating on the water, fronds folded in the buds, simple; macrospores and microspores borne in separate sori.

Genus 84. Salvinia. Leaves borne in whorls of 3, of which a are normal undivided leaves, borne on the dorsal side and the other, ventral one, i. e. dissected and metamorphosed to replace the roots, which are wanting; Sori borne on the basal segments of metamorphosed leaves.

Genus 85. Azolla. Fronds very small, borne in two dorsal rows, deeply bilobed; roots present, fine.

Family XI. Marsiliaceae. Family differs from the above family by creeping terrestial rhizome from which spring longstalked leaves of cru~~c~~ciform blade macrospores and microspores borne in the same sori, and circinate in vernation.

Genus 86. Marsilia. Characters of the family.

(p. 13)

Order I. *Ophioglossales*

Sporophytes terrestrial or epiphytic, herbaceous, consisting of a short fleshy rhizome, bearing numerous fibrous fleshy roots, and one or several leaves. Leaves (fronds) erect or pendent, not jointed, consisting of a basal common stalk bearing at its apex a simple to variously compound, sessile or stalked sterile blade and (in the fertile leaves) an erect long-stalked spore-bearing spike or pannicle (sporophyll) or (in *Cheiroglossa*) the sporophylls several, short-stalked and pendent. Sporangia in 2 rows, naked, opening by a transverse slit; spores uniform (plants homosporous), yellowish, Gametophytes (prothallia) hypogean, tube-like, usually lacking Chlorophyll and associated with an endophytic mycorhiza.

A single family.

Family I. *Ophioglossaceae* Presl. Tent. Pterid. 6. 1836.

Sporangia naked bivalvular, rather large and coriaceous, formed from the interior tissue of the fruiting branch, borne in erect spikes or panicles, which are borne with sterile leaves on a common stalk. Prothalia subterranean, usually devoid of Chlorophyll, monoecious, and associated with an endophytic mycorhiza. Terrestrial or epiphytic. Succulent leafy plants consisting of a short fleshy rootstock bearing one of several leaves and numerous fibrous often fleshy roots. The barren leaves (fronds) simple or compound or variously cut often fern-like is appearance; merely inclined in vernation, developed from under-ground buds formed either inside the base of the old stalk or by the side of it, sessile or stalked; veins free or anastomosing. Capsules more or less globose, opening across the apex or by a slit down the side; ring wanting. Rhizomes erect rarely creeping, sometimes tuberous. Stipes not articulate to the rhizome.

A small family of 3 genera in the tropics of both Hemispheres.

These are the most primitive living Pteridophyta. The origin of the sporangium, the vernation and the structure of the stomata recall Anthoceros; and these characters and the occurrence of collateral bundles with secondary thickening indicate a close affinity to which much have been the ancestors of the flowering plants.

Key to genera

1. Sterile fronds simple, entire or palmately lobed; venation reticulate; sporangia united in 2 rows in simple slender fleshy spike.......................1. *Ophioglossum*

1. Sterile fronds 1-4 times pinnately or palmately divided; venation free; sporangia globose, all distinct, borne in

all sides in a spike or panicle.

2. Fertile segment a spike; barren one palmately divided into generally 7 large lanceolate segments........... ....2. Helminthostachys

2. Fertile segment paniculate; barren one more compoundly pinnated into numerous irregular small segments......... ....3. Botrychium

(p. 14).

1. Ophioglossum Linne (Gen. plant. 503) Spec. Plant. 2. 1062, (1753).

Type: Ophioglossum vulgatum L.

Sporangia sessile, coriaceous, connate and coherent in two rows, as so as to form a narrow close simple ere~~a~~ct spike; spores copious, sulphur yellow. Rootstocks erect, fleshy, and sometimes tuberous with slender fleshy roots which are sometimes proliferous; buds placed by the side of the base of the naked stalk; small, fleshy, firms usually with one single erect sterile frond usually with a long slender petiole and an expanded simple entire, rarely lobed, blade resembling the leaf of some flowering plant, ovate, oblong or lanceolate, entire, the narrowed fruiting spike arising from the tissue of the top of the stalk of the sterile frond or from its base. (Greek "serpent" and "tongue" referring to the shape of the sterile portion of frond).

Species about 47, all small succulent plants, of wide distribution over both hemispheres, 7 recorded from China. With the exception of one rare species from Cape Colony, O. bergianum, all other species have their contracted fertile spike arising from the base of the sterile frond or from some distance down its stalk.

Key to Species

I. Epiphytic ferns, fronds pendulous, ribbon-like........... ....1. O. Pendulum

II. Terrestial ferns fronds upright, not ribbon-like

A. Sterile blade linear or lanceolate

1. Fertile segments rising from the base of sterile.. ....2. O. japonicum

2. Sterile segments stalked............................ ....3. O. braunii

B. Sterile blade ovate or elliptic

1. Base more or less cordate..4. O. reticulatum

2. Base cuneat or truncate

    a. Fronds 15-23 cm. long, midrib usually distinct..5. O. vulgatum

    b. Fronds much shorter (2.5-7.5 cm. long), midrib wanting

        (1) Rhizomes small, slightly tuberous.........................6. O. nudicaule

        (2) Rhizomes large, cylindrical or globose.............8. O. pedunculosum

1. Ophioglossum pendulum L. Sp. ed. II. 2. 1518, (1754); Hk. et Grev. te 19; HKBK. 446; Prantl. 331; Christ 364; NPFL. 469; Copel. Ferns Mal. Asiat. 5. (1906).

Rhizome epiphytic, giving rise to number of pendent fronds; stipes up to 10 cm. long, merging into the blade; sterile blade 20-100 or even 150 cm. long, 2-6 cm. broad, simple or more often forked, usually sinuate, fleshy-coriaceous but drying thin, veins reticulate with large areolae and no included veinlets; fertile segments one or often a pair, springing from below the middle of the sterile blade, short-stalked, with a fleshy spike 3-10 cm. or more long.

Mauritius to India, New south Walls, Hawaii, China: Hainan, New to China.

An ephyphitic fleshy drapery-like fern on the trunks of trees in tropic forests.
(P. 15).

2. Ophioglossum japnicum Prantl. Ber. deu. bot. Ges. I. 353, (1883); jahrb. bot. Cart. 3. 327 t. 8 f. 29, 1884; NPFL. 468; HKBK. 445.

Rootstocks slightly tuberous, common stipes hardly reaching above the ground; frond 5-10 cm. long, the sterile division placed not above far the base, 1.2-3.7 cm. long, 6-12 mm. broad, ovate or oblong-lanceolate, of thin texture, veins not distinct; fertile segments rising from the base of the sterile, 3-4 times as high, spike 1.2 cm. long, the peduncle often 5-7.5 cm. long, very slender; sporangia up to 30 on each side.

America to Brazil, India, Angola, Japan, China: Hupeh.

3. Ohioglossum braudii Prantl. Ber. deu bot. Ges. I. 351, (1883); Jahrb. bot. Gart. III. 313 t. 7. f. 8, (1884); NPFl. 406; Matthew 375, (1911).

Common stipe not reaching above the ground; sterile blade lanceolate, typically thin, but in the only reported collection from this part of the world said to be thicker, free veinlets few, and the midvein not branched, fertile segments arising below the base of the sterile.

Cape Verde Island, China: Yunnan.

Characterized by its linear sterile blade with aparently stout midrib, common stipes hardly reaching above the ground and sterile segments stalked.

4. Ophioglossum reticulatum L. Sp. 2. 1063, (1763); HKBK. 446 (pt.); Christ 363; Prantl. 330 t. 8 f. 32; NPFL. 469; Matthew 375, (1911).

Rootstocks not tuberous; fronds 15-30 cm. long, the sterile division placed about the midrib, 5-7.5 cm. long, 3.7-5 cm. broad, with a distinct half and distinctly cordate basal lobes, the point blunt or subacute; texture thin, the veins distinct, usually no midrib; fertile spikes 2.5 cm. or more long, on a slender peduncle, 5-10 cm. long, much overtopping the sterile segments.

Tropical America, East India, Himalayas, Cape Colony, Korea, China: Hupeh, Yunnan, Szechwan.

Similar to O. pedunculossum, but the sterile blade cordate above the short cuneat base. A less variable plant, without very small forms.

5. Ophioglossum vulgatum L. Sp. 2. 1062, (1753); HKBK. 445 (pt.); Prantl. 318 t. 7 f. 12, 16; Christ 363; NPFL. 467; Matthew 375, (1911).

Ophioglossum microstechum Ach., 1809.

Ophioglossum polyphyllum A. Br., 1844.

Rootstocks slender not tuberous; fronds 15-25 cm. long, mostly solitary; the sterile division generally placed about the middle, 5-10 cm. long, 1.8-2.5 cm. broad, ovate or ovate-oblong, rounded or obtuse at the apex, midrib indistinct or none; principal veins form a loose network, the meshes near, free from secondary veins. Fertile spike 2.5 cm. or more long, upon a peduncle 5-10 cm. long and considerably overtopping the sterile division when the plant is fully matured.

On meadows and pastures, rarely on dry slopes.

Australia, New Zialand, Temperate North America, Himalaya, Cape Colony, Japan, Hongkong, China: Manshuria.

A variable plant. Over 15 species have been described by different authors, but by a judicious discrimination, Hooker combined them all into one species.

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6. Ophioglossum nudicaule, Linn. f. Suppl. 443, (1781); Christ 363; NPFL. 468; Matthew 375, (1911).

Rootstocks slightly tuberous; fronds 5-10 cm. long, the sterile division placed not far from the base, 1.2-3.7 cm. long, 6-12 mm. broad, ovate or oblong, without a half or with only a slight one, the texture thin but the veins not distinct; fertile spikes 1.2 cm. long, the peduncle often 5-7.5 cm. long, very slender.

South America, South Africa, Braxil, India, Formosa, Hongkong.

7. Ophioglossum parvifolium Hook. et Grev. Bot. Misc. II. 218, (1833).

Rhizomea slightly tuberous. Whole plant 5-10 cm. long. barren segment ovate or oblong, 1¼-4 cm. long, ½-1½ cm. broad, sessile or subsessile, placed considerably below the middle of the whole plant, narrowed towards both ends. Texture thin, no evident costa; veins indistinct. Fertile spike 1-1¼ cm. long, the peduncle often 3-5 cm. long or longer.

India, China: Yunnan, Szechwan.

8. Ophioglossum pedunculosum Desv. Berl. Mag. V. 306. (1811); Prantl. 328 t. 8 f. 33. 34; NPFL. 469.

Ophioglossum moluccanum Schlecht., 1825.
Ophioglossum petiolatum Hooker, 1825.
Ophioglossum elongatum A. Cunn. 1836.

Rhizomes cylindrical or globose, with copious fleshy roots; common stipes arising 1-5 cm. or more above the ground; sterile blade ovate, usually acute, subentire, narrowed abruptly to a cuneat base, commonly 3-4 cm. long, the extremes being 1 cm. long; fertile segments arising from the base of the sterile or just below it; stipes of fertile segments 1-4 times exceeding thesterile one. A common and exceedingly variable species which has therefore received many names.

New Zealand, North Caledonia, India, South China.

2. Helminthostachys, Kaulfus, Flora 1822. 103;
Enum. 28. (1824).

Type: Osmunda zelanica l.

Fructifications consisting of glomerate, verticillate, pedicillate tufts of spore-cases, the worls terminated by a crist-like appancage and arranged in distichous spiked panicles on a distinct branch of the frouns;-cases fleshy-coriaceous, globose, sessile, inverse, bursting on the outer side from the base upwards in two equal or subequal hemispherical valves.

Fronds herbaceous or coriaceous, trifoliately digitatopedate, the fertile and sterile branches distinct; veins forked from a central costa, venules parallel, free; rhizomes stout, fleshy horizontal-creeping with coarse roots.

A genus limited to a single species, confined to tropical Asia.

Helminthostachys zelantica Hooker and Bauer in Gen. Fil. t. 47 (1840); Hk. in Gard. Ferns t. 28; Bedd. Ferns S. Ind. t. 69; Hk. in 2nd. Cent. Ferns t. 44; Christ in Farnkraut. Erde 365; Diels in Nat. Pfl. Fam. I. 4. 472; C. Chr. Ind. 344 (1906); v. A. v. R. in Malay. Ferns 777 (1908).

Helminthostachys dulcis Klf., Enum. 28, t. I. fig. I (1822).
(P. 17) Osmunda zeylanica Linn., Sp. Pl. 2: 1063 (1753).
Botrychium zeylanica Sw., Schrad. Journ. 1800, 2: 111 (1801).
Botryopteris mexicana Presl., Rel. Haenk. 1: yt, t. 12. fig. 1 I (1825).
Helminthostachys mexicana Spring, 1827.

Rhizome thick, fleshy, creeping, glabrous; stipes erect, 20-30 cm. long, greenish, sterile segment palmately pinnate, usually in 3 principal divisions, which are shortly petiolate, forked or pinnate; the ultimate segments lanceolate, 7-15 cm. long, 2-4 cm. broad, acuminate, the edge slightly toothed or entire, the base more or less cuneate; veins distinct, erect-patent, pinnate, usually forked texture thin herbaceous; fertile spike solitary, arising from the base of sterile segment, 7-20 cm. long, 1 cm. broad, on a peduncle of about the same length.

Distribution: Australia, New Caledonia, India, Ceylon, Philipines, Queensland, Cochin-China, Formosa China: Hainan.

A fairly common fern in Tropical Asia, inhabiting the dam or swampy places; from China it was collected only in Hainan.

3. Botrychium Swartz, Schrad. Journ. 1800^2, 110, (1801).

Type: Omanda lunaria L.

Like its relatives, the frond of Botrychium with an anterior fertile and a posterior sterile segments; the former mostly pinnate, with its contracted divisions bearing a double row of sessile naked sporangia, these are distinct, rather coriaceous, not reticulate, globular, with a ring and opening transversely aross the top into two valves, sterile segments of the frond ternately or pinnately divided or decompound; veins all free; spores copious, sulphur-colored. Rootstock very short, fleshy, erect, with clustered fleshy roots, the base of the sheathed stalk containing the bud for the next year's frond; (Greek "a cluster of grapes," from the appearance of fruitification).

A small genus of about 36 species mostly in temperate region of the both hemispheres, 6 are known in China. It differs from Ophioglossum in its sporangia arranged in pinnate or compound distinct spikes, and veins being all free.

Key to species

1. Pinnae flabellate rather than pinnate.

  2. Sterile and fertile segments sparating just below sterile blade..............................1. B. lunaria

  2. Common stalk very short.............(B. simplex)

1. Fronds at least tripinnatifid.

  2. Fertile segment~~as~~ arising below the base of the sterile.

    3. Sterile frond fleshy, typically with a hyaline margin.

      4. Segments widened on both sides above the base.... ....2. B. matricariae

      4. Segments not widened on both sides................ ....3. B. obliquun

    3. Sterile frond without hyaline margin.

      4. Frond fleshy...........4. B. ~~ter~~ternatum

      4. Frond thin, herbaceous............................ ....5. B. japonicum

  2. Fertile segment arising from base of the sterile....... ....6. B. virginianum

  2. Fertile segment arising from the rachis of the sterile. ....7. B. lanuginosum

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1. Botrychium Lunaria (L.) Sw. Schrad. Journ. 1800^2. 110, (1801); NKBK. 447; Christ 365; NPFL. 470.

Osmanda lunaria L., 1753.
Botrypus lunarium Rich., 1801.

Stipes stout, 2.5-10 cm. long; sterile segments sessile or nearly so, 2.5-7.5 cm. long, 1.2-10 cm. broad, not much broader at the base than the middle, cut down to a flattened rachis into several distinct, close, entire or notched cuneato-flabellate pinnae on both sides; fertile peduncle equaling or excelling the sterile segments when fully developed; panicle close, 2.5-5 cm. long, lanceolate-deltoid, bipinnate.

Arctic Europe, Himalayas, Australia, N. W. America, Canada,

Asia; Japan, China: Yunnan, Szechwan, Manchuria.

Botrychium simplex Hitch Amer. Journ. Sci. VI. 103 t. 8. (1823); HkBK. 447; Christ 336; NPFL. 470.

Allied to the above, but said to be decidedly smaller and more simple, and the stalks of the two segments separating well below the base of the sterile one.

North America, North Europe, India, Japan, China: Chihli, Manchuria, Yunnan, Szechwan.

2. Botrychium matricariae (Schrank) Spr. Syst. 4. 23. (1827); NPFL. 471 Matthew 351, (1911).

Osmenda matricariae Schrank, Bair. Fl. 2. 419. 1789.
Botrychium rutaceum Sw., 1801.
Botrychium matricarioides Willd, 1810.

Stipes separating less than halfway up to the base of the sterile segments; young fronds hairy; sterile blade deltoid, in Chinese specimens 5 cm. long, 4 cm. wide, tripinnate, the lobes small, oval, wideing abruptly on both sides above the base, or even cordate, margin hyaline, because of thick epidermic; veins spreading above the base; stipes of the ample fertile segments 10 cm. long, the plants grow larger elsewhere.

Europe, America, China: Yunnan, Szechwan.

3. Botrychium obliquum Muhl; Willd. Sp. 5. 63. (1810); NPFL. 471; Matthew, 351 (1911).

Osmunda obliquum Poir., 1816.

Like Botrychium Matricariae, but the common stipe very short--- only 1 cm. long in Chinese specimens --- the sterile segments broader than long, its ultimate division more ample (i. e. less cut), and oblique, usually not much widened above the base on the upper side, and the veins less spreading.

E. N. America, China: Szechwan, Yunnan.

The sterile segments of Botrychium matricariae are widened on both sides above base.

4. Botrychium ternatum (Thb.) Sw. Schrad. Journ. 1800^2. 111, (1801); HkBK. 449 (pt.); Christ 366 (part); NPFL. 471.

Osmunda ternatum Thunb., Fl. Jap. 329 t. 32, (1784).

Stipes 2.5-5 cm. long; petiole of the sterile segment 5-10 cm. long, the latter 7.5-15 cm. each way, deltoid, tri- or qua-

dripinnatifid; lower pinnae much the largest, and pinnules of the lower side larger than the thers, oblong or subdeltoid, stalked, the ultimate division oblong or obovate, often 6 mm. broad, blunt or acute, slightly toothed; fertile peduncle 15-23 cm. long, delttoid, very compoung.

America, New Zealand, Australia, Siberia, Himalayas, Japan, China: Kweichow, Yunnan, Szechwan, Hupeh, Kiukiang, Manchuria.

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Similar to B. matricariae and B. obliquum, differs by thinner texture, without a hyaline border and with the margin finely serrated.

5. Botrychium japonicum (Prantl.) underw, Bull. Torr. Cl. 25. 538, (1898); Matthew, 351 (1911).

Botrychium darecifolium B. japonicum Prantl., Jahrb. Bot. Gar. Berl. 3, 340, (1884).

Closely allied to Botrychium darecifolium, the stipes forking about halfway from the base of the sterile blade to the stem, the sterile margin more finely and regularly toothed, and the fertile segments far overtopping the sterile.

Japan Korea, China: Hupeh.

The fertile segments of Botrychium daruecifolium arising above the middle of the petiole, otherwise the present species is almost identical with Indian one.

6. Botrychium virginianum (L.) Sw. Schrad. Journ. 1800^2. 111, (1801); HKBK. 449 (excl. B); Christ 366; NPFL. 472; Matthew 351, (1911).

Osmunda virginena L., 1756.
Osmunda vultifida Gmel., 1768.
Osmunda virginica Houtt., 1786.
Botrychium anthemoides Presl., 1848.

Stipes 7.5-45 cm. long; sterile segments sessile, 10-50 cm. each way, deltoid, quadripinnatifid; lower pinnae much the largest; pinnules ovate-oblong, close, cut down to a broadly-winged rachis into finely cut linear-oblong segments; both sides naked; fertile peduncle equaling or overtopping the sterile segments, when mature, arising from its base; panicles. 2.5-10 cm. long, lax, oblong, generally not more than bipinnate.

America, Europe, Austria, Himalayas, Formosa, Japan, China: Manchuria, Yunnan, Hupeh, Szechwan.

7. Botrychium lanuginosum Wall. List n. 48, (1828); Hk. et Grev. Ic. Fil. t. 79, (1829); Christ 366; NPFL. 471; Matthew 351. (1911).

Botrychium virginianum Sw. var. lanuginosum HK., HKBK. 448; HK. Gen. Fil. t. 29.

Stipes 7.5-45 cm. long; barren segment 10-40 cm. long and broad, deltoid, 3-4-pinnatifid. Lower pinnae much the largest. Pinnules ovate-oblong, variously lobed and decompound. Texture subcarnose, main and partial rachis more or less hairy; surfaces slightly hairy or at length naked. Fertile peduncle arising from the centre of the barren segment, which not or scarcely overtops the panicle.

N. India, Ceylon, China:

Similar to B. virginianum, but the main axes permanently pubescent, the texture not so thin, the secondary or tertiary pinnules more flabellate and the fertile segment arising from the rachis of the fertile and the whole fertile segment usually not equalling the sterile.

(P. 20). Order II. Marattiales

Sporophytes terrestrial, with fleshy or tough, creeping or massive erect rhizomes and soft coarse fleshy roots. Leaves (fronds) coarse, often very large, distichous or caespitose, stipulate, jointed to the rhizome, circinate in vernation, the blades simple to several times pinnate or pinnately divided or onece palmately divided, dimorphous or not. Sporangia separate or coalescent and forming thick circular or oblong to linear synangia, opening by vertical pores or longitudinal slits spores uniform (plants homosporous), diplanate or triplanate. Gametophytes (prothallia) green, flat.

A single family.

Family II. Marattiaceae

Sori on the under surface of normal fronds, round or oblong, consisting of more or less 6-24 free or connected capsules, place in a whorl or in 2 close rows; indusium wanting or minute, consisting of 2 opposite, flat, entire or deeply fimbriate, inconspicuous, inferior scales, adpressed to the parenchyma; ring wanting; capsules opening by a slit down the inner side or by a pore at the apes. Rhizomes erect or creeping. Stipes with 2 large stout stipules. Fronds either large and pinnately divided, or small and simple or digitate; leaflets often articulate; veins free or anastomosing.

5.genera, tropical and extropical in the souther Hemisphere; 2 from South China.

Key to genera

1. Sorus line consisting of generally less than 20 sporangia, placed near to margin than to costa; frond at least bipinnate......................4. Angiopteris

1. Sorus line consisting of 80-160 sporangia, placed midway between costa and margin; frond simply pinnate...5. Archangiopteris

4. Angiopteris Hoffmann. Comm. Soc. Reg. Gotting. 12. 29, (1796); Hieronymus, Hedwigia LXI. 242, (1919).

Type: Polypodium evectum Forst.

Sori oblong boat-shaped, raised, placed side by side in a continuous row near the margin on the under side of the frond segments; each sorus consisting of a small number of spore-cases, arranged in two rows, at first connate, at length distinct, and all opening inwards by a slit down the side in 2 short valves; indusium none; spore-case without a ring. Fronds large pinnate or decompound. Rhizomes fleshy, subglobose, often becoming two fleshy stipulariform appendages; the base of the stipes clavate, pseudo-articulate with the apex; pinnae and pinnules articulate with the rachis. (Greek. "vessel-fern" refering to the boat-shaped marginal sori).

A genus of about 75 more or less related species confined to tropical Asia; 5 recorded in China. Easily propagated by the fleshy scales at the base of the fronds; no seedlings so far ever raised from spores, though the latter are abundantly produced.

An elaborate illustrated monograph of the suborder Marattiaceae by De Vriese and Harting at Leyden defined 16 species and Presl. 10 species, but Hooker and Baker said in Synopsis Filicum, "we can not determine
(P. 21).
more than one clearly-marked species." The species of the genus varies considerably in texture, closeness of the veins, and the number of capsules in each sorus. Moore also enumerated numerous Indian species.

Key to species

I. Recurrent veinlets present, reaching at least ½ way down to the costa.........................1. A. evecta

I. Recurrent veinlets wanting or very short, often hardly visible.

2. Pinnules fertile only on the lower ½; margin of involucre only irregularly denticulate...2. A. fokiensis

2. Pinnule fertile almost throughout whole length.

   3. Pinnules to 10 cm. long, 2 cm. broad..................
      ....3. A. yunnanensis

   3. Pinnules above 15 cm. long.

      4. Pinnules 3 cm. or more broad......................
         ....4. A. crassipes

      4. Pinnules to 1.7 cm. broad.........................
         ....5. A. caudatiformis

1. Angiopteris evecta (Forst.) Hoffm. Comm. Soc. Reg. Gott. 12. 29 t. 5. (1796); HKBA. 440 (pt.); de Vriese Mong. 16; Christ 358 (pt.); NPFL. 438; Matthew 440, (1911).

Polypodium evetum Forst., 1786.
Danaea evetum Spr., 1799.

Stems forming an erect thick trunck, sometimes attaining 60 cm. or 2 m. in height and 45-60 cm. or more in diameter. Stipes swollen and articulated at the base, furnished with two large leathery auricles, which remain attached to the stem (or caudex after it falls. Fronds 2-5 m. long, twice pinnate, spreading on a more or less downy stipes, but otherwise quite globrous, dark-green and shining; pinnae 30-90 cm. long, the lowest the largest, the rachis swollen at the base; pinnules 10-30 cm. long 1.3-4 cm. broad, linear-oblong, sessile or short-stalked, subrounded or subtruncate rounded at base, the apex acuminate, the margin entire or finely toothed. Texture sub-coriaceous. Veins simple forked, nearly parallel. Sori usually consisting 8-15 sporangia or capsule, in close rows near the margin, almost hidening the inferior fimbriated involucer.

Japan, Formosa, Loochoo China: Fokien, Yunnan, Kweichow, Hongkong, India.

Dr. H. H. Hu has informed me that he saw it growing in South Kiangsi and Pei-yen-tung, Wenchow, in S. Chekiang where it is regarded by natives as a valuable medium. This is probally the Northern extremity in the distribution of this species.

This variable species is construed as including several forms considered by de Vries as distinct species, which, in fact, are united by intermediates and are difficult of determination.

2. Angiopteris fokiensis Hieron. Hedwigia LXI. 275 (1919).

Rachis of pinnae compresso-quadrangular, glauco-green when dried, plano- conves below, bi- or subtrisulcate above, narrowly winged on lateral sides (wing glauco-green, scarcely ½ mm. broad, entire), articulatate at the base (geniculum scarcely over 1 cm. long), scarcely over 1½ mm. broad above the base. Pinnules 15-23 on each side, subchartaceous, glauco-green above, paler, sub-glabrous beneath with slightly perceptible farinose-granular indumentum, naked, shortly petiolulate (petiolules about 2 mm. long, scarcely 1 mm. broad at base,) opposite or subopposite (inferior ones) or else alternate (superior ones), 1-2 cm. far apart between bases, entire or crenulato-serrulate in large forms, linear-
(P. 22).
oblanceolate, truncato-rotund at the base, the upper ones fertile slightly narrower than the sterile ones, horizontal-patent, but much oblique or suberect towards the apex, the uppermost ones slightly falcato-incurved, shortly acuminate, terminated in a deltoid point about ½-1 cm. long, 3-4 mm. broad at the base, the basal pinnules reduced, scarcely over 4½ cm. long, under 1 cm. broad above the middle and up to 1.5 cm. broad above the middle in the sterile ones. Costae in the pinnules prominent on both sides, plano-convex, slightly paler than mesophyll, squamulose-ferruginous beneath, base slightly ciliated and sparcely hairy; lateral veins branch from the costa at 80-85 degrees of angles but much oblique towards the apex of the leaves, simple or forked above the base or rarely above the middle, scarcely prominent on both sides, subconcolored, subpellucido-ferruginous when hold up against light, 1-1½ mm. far apart between bases, the soriferous ones scarcely or slightly incrassate at apices, slightly incurved, scarcely or slightly extending into the teeth with base shortly decurrent along the costa. Striae usually none or most rarely obsolete, very short, scarcely ½ mm. long, not attingent to the linear sori. Receptaceles linear cristato-elevate with rudimentary elliptical involucre, about 0.5-0.6 mm. long, 0.25 mm. broad, about 1 mm. or slightly more far apart; involucre ferruginous, scariose with obsolete denticulate margin (not ciliated). Sori 1-1½ mm. long, scarcely ¾ mm. broad, linear subirregular, borne at the base of pinnules, interrucied towards the apex, subcontiguous or slightly separate.

Fukien.

Caracterized by the upper part or sometimes ¾ of the pinnules remains sterile, the thin leathery involucre with only irregularly denticulate margin, while in most other species the margin of involucre provided with branchedarticulated cilias.

3. *Angiopteris yunnanensis* Hieron. Hedwigia LXI. 277, (1919).

Angiopteris evecta var. alata Christ, Bull. Herb. Boiss. VI. 973, 1896.

Rachis of pinnae subcompresso-quadrangular, opaque when dry, sordid-brown castaneous, plano-convex beneath, blackish castaneous, bisulcate above, prominently winged towards the apex (wings blackish olive when dry, about 1 mm. broad), base articulated, (geniculum about 2½ cm. long), about 4 mm. thick above the base. Pinnules about 20 on each side under the terminal one, texture paperaceous when dry, black-olive above, paler beneath, covered with slightly perceptible farinaceous-subpapillose indumentum, sparsely pilose particularly on the costa and adjoining spaces (hairs articulate, flexuose, ambercolored, simple or forked at base or repeatedly forked, scarcely over 0.3 mm. long, the lower ones shortly petiolulate (petiolules scarcely over 1 mm. long, and thick at base), the upper ones subsessile (petiolules shortly winged), the basal ones alternate, the rest sub-opposite, about 2½ cm. far apart, entire from the base upward, or subundulate in large forms, rounded on the posterior base and subtruncate-rounded on the anterior, the lower ones ovate-lanceolate, the rest ovate-oblong, horizontal-patent, forming angles 70-80 degrees with rachis, suberect or falcato-incurved in the uppermost part, acuminate into an elongate-deltoid apex 1½-2 cm. long, 4-5 mm. broad at the base, conspicuously serrulate, margin provided with a very narrow callous-band, the largest fertile pinnules 9½-10 cm. long, about 2 cm. broad in the middle, and 2½ cm. broad in the terminal one; the pinnules gradually decrescent towards the base pinnae, the lowest 4-5 cm. long, 10-13 mm. broad above the base. Costa of pinnules plane, slightly prominent, subferrugineous-olive above, blackish-olive beneath lateral veins branch at 75-85 degrees to the costa, more oblique in the upper ones, simple or forked from the base, or below but rarely above the middle, 1-1½ mm. far apart at the base, apices always simple, slightly incrassate not attingent to the margin (about 0.15-0.2 mm. off the margin). Striae recurrent, none or obsolete, very short, not go beyond the sori. Receptacle oval-linear, cristato-elevated, much broader than veinlets, about ¾ mm. long, scarcely ½ mm. distant from the entire margin, rudimentum of indusium none or in the form of articulate forked or repeatedly forked hairs about 0.1 mm. long. Sori about 1-1½ mm. long, ½ mm. broad, linear, subregularly continous from the base to the apex of the pinnules.

Yunnan.

Most closely related to A. gaudichaudiana De Vries, which however, has wingless rachis of the pinnae, longer petiolules of the pinnules with cuneate base, distinctly serrated margin of broader pinnules and somewhat smaller sporangia.

4. Angiopteris crassipes Wall. List n. 187, (1828); de Vriese Monog. 27; NPFL. 438; Matthew 342, (1911).

Pinnules pellucid, subpetiolate, linear-lanceolate or lanceolate-oblong, the base unequally cuneate or rounded; largest pinnules more or less 16.5 cm. long or longer, more or less 2.3 cm. broad or broader; colour pale or yellow-green;

veins suboblique, opaque, fascous beneath; sori contiguous, near the edge, consisting of more or less 4-8 capsules; indusium fimbriato-laciniate.

Sumatra, Malacca, North India, Burman, Loochoo Japan, China: Kweichow, Szechwan.

5. Angiopteris caudatiformis Hieron. Hedwigia LXI. 278, (1919).

Rachis of the pinnae compresso-quadrangular, opaque, sorbidbrown, plano-convex below when dry, subshinning castaneous, trisulcate above, provided in the upper part with prominent linear or abortive wings, base articulate (geniculum about 1½ cm. long), 5 mm. thick above the base. Pinnules about 20-25 on each side, texture paperaceous, fulgino-olive above slightly paler below with slihtly perceptible farinaceo-subpapillose indumentum and sparcely pilose (hairs articulate, flexuose, ferruginous, dichotomously branched, to 1 mm. long), opposite or subopposite in the lower ones, alternate in the superior ones, about 2½-3 cm. far apart, entire from the base upward or dentato-serrulate in the large forms, rotundo-crenate on the posterior side, cuneate on the anterior, linear-lanceolate, forming 6-70 degrees with the rachis, suberect or slightly falcato-incurved towards the apex, acuminate into broadly elongato-deltoid serrate apex about 1½-2 cm. long, 3-4 mm. broad at the base, the middle fertile pinnules about 15 cm. long, 1½ cm. broad at the middle, the terminal pinnule slightly broader than lateral ones, 17 mm. broad at the middle. Costa of the pinnules slightly prominent on both sides, plane, slightly channelled above when dry, suconcolored or obscurely olive-green; lateral veins branch from the costa at 70-80 degrees, subpatent, more oblique towards the apex, slightly incurved above the sori, simple or forked from or above the base or below or rarely above the middle subconcolored, slightly incrassate towards the apex. Striae recurrent, none or obsolete and very short, rarely extending beyond the sori.
(P. 24).
Receptacles linear, cristato-elevated, slightly broader than the veinlets, about 1-1½ cm. long, 2 mm. remote from the apex of serratures. Rudimentum of involucre in the form of articulate simple or forked, rare repeatedly forked hairs, scarcely over 0.15 mm. long. Sori 2-2½ mm. long, 0.5-0.6 mm. broad, linear, extending from near the entire base up to the apex of pinnules.

Yunnan.

In habit the present species is very near to A. Caudata De Vries from Philippijes, but differs by more cuneat base of the broader pinnules much longer sori falling more short from the margin of the pinnules, the distinctly thickened apex of the veinlets which more shallowly extend into the serratures and, particularly, the absence of or only rudimentary and then very short "false veins".

5. Archangiopteris Christ and Giesenhagen, Flora 72. 77. (1899).

Type: Archangiopteris henryi Christ and Giesenhagen.

Fronds simple pinnate, pinnae with inflatted petioles few; veins free; sori linear, consisting of 80-160 sporangia, midway between costa and margin; sporangia very small, and numerous; scales of the indusium persistent as a white line along the middle of each sorus.

A monotypic genus, endemic in S. W. China.

Archangiopteris henryi Christ et Giesenhagen in Flora Regensb. 73 (1899); Christ in Bull. Boiss. 7: (1899); Diels in Nat. Pfl. Fam. 1. 4. 439; C. Chr. Ind. 52 (1906); Matthew in Journ. Linn. Soc. 39: 342 (1911).

Rhizome not seen; stipe about 50 cm. long, thick as swan's quill, terete, obscurely green, not articulate to the rhizome, and like rachis and the petioles obscurely hairy with lanceolate scales; frond about 50 cm. long, 25 cm. broad, ovate; pinnae remote, alternate, 3-5 on each side, similar to the terminal one, oblong-ovate, acute, 25 cm. long, 6 cm. broad, entire, slightly crenulate about the middle, acutely serrate towards the apex, petiole 1.5-2 cm. long, blackish, inflatted, conspicously pilose; texture thin chartaceous, light green, stipes and petioles rather succulent; veins dense, about 50 in each side, almost horizontally patant, almost extending to the margin; sori medial, with a broad free space about [illegible] cm. broad between the margin; sori medial, with a broad free space about [illegible] cm. broad between the margin and costa, linear, reddish-brown, about 80 on each side, to 2 cm. long, 1. mm. broad, exindusiate.

Distribution: Yunnan.

This peculiar fern holds a systematic place between Danaea of America and Angiopteris of tropical Asia, from the latter, it differs by elongate moniliform medial sori, consisting of numerous sporangia, inflatted petiole and simply pinnate frond. One of the most noteworthy discoveries made by A Henry. A very rare plant, as is not known elsewhere in this country.

Order III. Filicales

Sporophytes terrestrial, epiphytic, or (in one family) aquatic, herbaceous to arborescent, consisting of a radicate and creeping ascending or erect primary axis, the stem (rhizome or caudex) and more or less expanded leaves (fronds), these minute to several meters tall and of diverse froms. Sporangia mainly borne on the under surface of the leaves commonly in clusters (sori) on the veins or within special marginal

inducia, or, less commonly, irregularly or in rows upon rachiform or scarcely foliose pinnae or segments, usually prov~~e~~ided with an elastic ring of thick-walled cells (annulus) for spore disposal; inducium of various forms, or wholly wanting. Gometophytes (prothallia) normally in the form of green, flattish or fillamentous prothallia, bearing both archegonia and antheridia together (monoecious) or, less commonly, on separate individuals (dioecious).

6 families of wide distribution.

Family III. Hymenophyllaceae

Sori marginal, terminal on the veins, exserted or immersed in the substance of the frond. Receptacle erect, oblong, capitate, malleiform, clavate or columnar, filiform, included or exerted. Sporangia dense, imbricate, compressed, surrounded by a broad, horizontal or subhorizontal, complete ring, opening vertically. Inducium marginal, inferior, 2-valved or more or less tubular urceolate; cup-shaped or obconical with the mouth truncate, dilated or more or less 2-lipped, arising at the tip of a veins, mostly of the same texture as the frond, opening outward~~y~~ly Delicate or dainty, mostly matted small ferns with filiform of slender creeping or suberect rhizomes. Fronds often small, numerous, crowded and membranaceous, rarely subcoriaceous; blades very thin, entire, erose, toothed or usually much divided, of pellucid tissue, usually consisting of a single layer of cells; veins free.

2 genera, in Tropics, and Subtropics, rarely inhabiting cooler climate, both are represented in warmer parts of China.

Key to genera

I. Prothallium flattened or bandlike; inducium more or less deeply 2-valved; receptacle most included; surface of the sporangia divided into many, uniform cells.........
.................................6. Hymenophullum

II. Prothallium threadlike; inducium tubular or funnel-shaped, the mouth sometimes 2-lipped; receptacle mostly exerted; surface of the sporangia divided into few unequal cells.
.................................7. Trichomanes.

6. Hymenophyllum (L.) Smith, Mem. Acad. Turin. 5, 418, (1793).

Type: Trichomanes tunbrigense L.

Sori marginal, more or less sunk in the frond or exarted, terminating costa or veins or 2-valved of nearly the same texture as the frond,
(P. 26).
toothed or fringed or entire; receptacle elongated, columnar,

exerted or included; capsule mostly orbicular, depressed, attached by the centre, furnished with a broad transverse ring opening irregularly at the apex; veins free, bearing at the apex sessile or subsessile lenticular or turbinate spore cases, dichotomously branched, simple and costa-like in the venules free; fronds simple or decompoundly divided, pellucid membranaceous; rhizomes creeping, usually filiform. (Greek, "membrane-leaf" evidently alluding to the thin pellucid membranaceous fronds).

Species about 250, nearly all of which are tropical and temperate plants and like all members of the family are of comparatively small dimensions and with fronds of very thin delicate texture, often of a lurid or olivaceous green; frequently epiphytic upon trunks of tree or damp rocky cliffs. 18 recorded in China.

Closely allied to Trichomanes, differs chiefly by the indusium consisting of 2-valves, instead of being blended into a cup.

Key to species of *Hymenophyllum*

1. Ultimate segments of the frond entire (Euhymenophyllum).

2. Edge of the frond more or less crisped or curled.

3. Edge in all parts strongly crisped, segment 1 mm. broad.............................1. *H. corrugatum*

3. Only the wings along stipes and rachis crisped, segment at least twice as broad as the preceeding.... ....2. *H. australe*

2. Edge of the frond not crisped or curled.

3. Stipes winged throughout.

4. Plants pendent, below 15 cm. long, frond bipinnatifid...........................3. *H. wrightii*

4. Plants erect, much taller, frond tripinnatifid... ....4. *H. dilatatum*

3. Stipes not winged or only slightly winged towards apex.

4. Frond hairy on the rachis and principal veins.

5. Frond ovate, 3 cm. long, sparsely covered with reddish-hairs.............5. *H. delavayi*

5. Frond lanceolate-oblong, above 5 cm. long, ferruginous hairy on rachis and principal veins.....................6. *H. exsertum*

4. Fronds glabrous.

  5. Fronds mostly 1-5 cm. long.

    6. Sori numerous, confined to the uppermost pinnae, in the form of a close panicle; inducium about 2 mm. abroad.................. ....7. H. paniculiflorum

    6. Sori more sparse, not confined to the uppermost pinnae nor in close panicles.

      7. Inducium obovate, rounded at the base... ....8. H. blumeanum

      7. Inducium hemispherical, cuneate at the base...............9. H. tenellum

  5. Fronds above 5 cm. long.

    6. Stipes above 10 cm. long...................... ....10. H. fuciforme

    6. Stipes below cm. long..11. H. polyanthos

(P. 27).

1. Ultimate segments spinuloso-denticulate (Leptocionium).

  2. Plants pilose

    3. Fronds cuneato-flabellate oblong, 2.5 cm. long, simply pinnatifid with simple lower segments............ ....12. H. spicatum

    3. Frond ovate, 7 cm. long, tripinnatifid, throughout.........................13. H. omiense

  2. Plants glabrous.

    3. Edge crisped

      4. Frond bipinnatifid, pinnae ovale............... ....14. H. fastigiosum

      4. Frond tripinnatifid, pinnae rhomboidal, twice as broad as long..............15. H. denticulatum

    3. Edge not crisped.

      4. Stipes 2.5 cm. long, inducium orbicular.

        5. Ultimate segments linear.16. H. barbatum

        5. Ultimate segments oblong.17. H. Henryi

4. Stipes much shorter; inducium ovate.............
.......................18. H. oxydon

1. Hymenophyllum corrugatum Christ, Bull. Boiss. 2. III, 508, (1903); Matthew 360, (1911).

A dense caespitose fern; rhizomes filiform, much branched and densely interwovened; stipes remote, rigid, flexuous, dark purple, glabrous on the upper part and so is the rachis, incrassate, very narrowly winged, 2-5 cm. long; lamina 2-3 cm. long, rarely longer, deltoid-ovate, tripinnatifid; pinnae 8-10 on each side; rachis spreading patent, or deflexed, confert, ovate, pinnules very confert pinnate all the way into numerous laciniae, often palmate, 2-5 mm. long, scarcely 1 mm. broad, linear-lanceolate, often cuneate, obtusish, all parts of the frond strongly crispato-undulate, margin, entire glabrous, obscurely brown; sori numerous, 1 mm. long, terminal valves round-ovate, often suborbicular with entire margin, receptacles included.

Hupeh: Chang Yang Hsien.

Var. elongatum, Christ, Bull. Geogr. Bot. Man. xvi, 101, (1906). Differs from the low and broad ovate type in frond being long-stipitate, much elongated and finer divided, to 30 cm. long.

2. Hymenophyllum australe Willd. Sp. 5. 527, (1810); Christ 17; NPFL. 108; Matthew /% 370, (1911).

Hymenophyllum javanicum Spr., 1827; v. d. B. Hym. Jav. 50; HKBK. 60.
Hymenophyllum crispatum Wall., 1828; Hk. et Grev. t. 77.
Hymenophyllum fimbriatum J. Sm., 1841.
Hymenophyllum erosum Bl., 1828; v. d. B. Hym. Jav. 54 t. 43.
Hymenophyllum micranthum v. d. B., Hym. Jav. 52 t. 41, 1856.

Stipes 5-10 cm. long, erect, margined above with a broad crisped wing; fronds 10-20 cm. long 7.5-10 cm. broad, triangular, tripinnatifid; main rachis bordered throughout with a broad crisped wing; lower pinnae 3.7-8 cm. long, triangular-rhomboidal, erecto-patent, divided down to a narrow crisped centre into several plane or slightly crisped pinnules on both sides, the lower of which are several times deeply pinnatifid; sori 6-20 to a pinna, terminal and axillary on the segments on both sides; involucre about as broad as the segments, divided down nearly to the base, valves orbicular, entire or denticulate.

Australia, India, Malaya, Ceylon, Loochoo, Philippines, (P. 28).
New Zealand, Japan, Hongkong, China: Yunnan, Szechwan, Fukien, Kwangsi, Kwantung.

3. *Hymenophyllum wrightii* v. d. B. Ned. Kr. Arch. 4. 391, (1859); NPFL. 58.

Stipes very slender, 2.5-7.5 cm. long; fronds flaccid, pendent, 5-15 cm. long by 2.5-5 cm. broad, linear-oblong or oblong, bipinnatifid, the main rachis winged throughout; pinnae simple, linear forked or pinnatifid, with two or three deeply-cut segments on each side, which are 6-12 mm. long, 2 mm. broad; sori large, terminal on the segments of the upper pinnae, often 2 mm. broad; divided halfway down or more, the base cuneate, the valves rounded.

Japan, China: Kwangtung.

4. *Hymenophyllum dilatatum* (Forst) Sw. Schrad. Journ. 1800^2. 100, (1811); HKBK. 62, 465; Christ 17; NPFL. 106.

Trichomanes dilatatum Forst., Prod. 85, 1786.
Hymenophyllum formosum Brack., 1854; v. d. B. Hym. Jav. 59 t. 47. 48.
Hymenophyllum cumingii v. d. B., 1859.
Hymenophyllum macrocarpum v. d. B., 1859.

Stipes 5-10 cm. long, erect, with [illegible] fronds 15-30 cm. lo[illegible] tripinnatifid; main [illegible] flat; lower pinnae [illegible] down nearly to the rachis, the lower pinnae all bipinnatifid; sori 2-12 to a pinna, terminal or axillary on the segments on both sides, divided about halfway down; valves rounded, entire, involucre often exserted.

New Zealand, Java, Tahiti, Samoa, Aneitum, Fiji, other Polynesian Islands, China: Yunnan, Kwangtung Lo-fau Shan.

Closely allied to *H. fuciforme* but different in indusium.

5. *Hymenophyllum delavayi* Christ, Bull. Soc. Fr. 52. Mem. I. 11, (1905); Matthew 376, (1911).

Densely tufted fern; rhizomes filiform, densely crowded, sparingly pilose; stipes filiform, black, 2 cm. long, not winged; lamina 3 cm. long, 2 cm. broad, ovate, the upper rachis broadly winged the ultimate pinnae free, or broadly adnate, about 6 on each side of the rachis, ovate, 8 mm. long, laciniate, loves about 3 on each side of the costa, rarely dichotomous, with entire margin, subacute, 3 mm. long, 1½ mm. broad; veins coarse, black, prominent; sori sessile, solitary in the sinuses of the lobes, indusium 1 mm. broad and long, rounded, including sori, or moderately protruding, irregularly lacerate; fronds glabrous, or covered sparcely with reddish hairs, color fuscous, texture rather firm.

6. Hymenophyllum exsertum Wall. List n. 170, (1828); HKBK. 58; Christ 18; HPFL. 109.

Hymenophyllum macroglossum v. d. B., 1863.

Stipes 2.5-5 cm. long, slender, frond 5-15 cm. long, 2.5-5 cm. broad, lanceolate-oblong, bipinnatifid; main rachis winged above or throught, more or less densely clothed with deciduous ferruginous hairs; lower pinnae rhomboidal, lanceolate-acuminate, divided more than halfway down to the rachis into simple or forked linear pinnules, slightly hairy on the principal veins; sori 2-8 to a pinna, terminal or axillary on the segments on both sides; indusium divided down nearly to the base; valves oblong, bluntly denticulate at the apex.

Throughout N. India, to Ceylon, China: Yunnan.

7. Hymenophyllum paniculiflorum Presl. Hym. 32. 55. (1843); v. d. B. Hym. Jav. 49. t. 39; Matthew 570, (1911).

Rhizomes filiform, sparingly hairy. Stipes naked, slender, 0.4-2 cm. long, naked, wingedabove; frond ovate to lanceolate-oblong, 0.8-2 cm. long, 0.4-1 cm. broad, cut down to a narrowly winged rachis. Pinnae spreading or erecto-patent, ovate or suborbicular, deeply pinnatifid, pinnules simple, forked or pinnatifid again; ultimate segments to 3 mm. long, more or less [illegible] mm. broad; color reddish or brownish; sori numerous, confined to the uppermost pinnae, very close as to form a panicle; indusium large, reddish, elliptical or broadly obovate, more or less 2 mm. long, more or less 1 mm. broad, jointed in the lower half, the valves entire; receptacle short columnar, included.

Malesia, Japan, China: Szechwan, Yunnan.

8. Hymenophyllum blumeanum Spr. Syst. 4. 131. 1826; v. d. B. Hym. Jav. 46 t. 36; HPfl. 108; Matthew 570, (1911).

Hymenophyllum pectinatum Nees et Blume, Nova Acta 11. 124 t. 12 f. 5. 1823. (non Cav. 1802).
Hymenophyllum microsorum v. d. B., Ned. Kr. Arch. 5^1. 156, 1863; HKBK. 59; HPFL. 108.
Hymenophyllum integrum v. d. B., Hym, Jav. 49 t. 38.
Hymenophyllum pycnocarpum v. d. B., Hym. Jav. 48 t. 37.

Rhizome filiform; stipes slender, 0.4-1.7 cm. long, not rarely marginate, not winged, or winged in the upper half only; fronds obovate to lanceolate or even linear, 2-6 cm. long, more or less 4-8 cm. broad; main rachis narrowly winged; central pinnae the longest, oblong or lanceolate, deltoid or rhomboidal, cut down to a winged rachis into simple or once or more times divided segments on each side; ultimate lobes more or less 2-4 mm. long [illegible]-1 mm. broad, entire, each with a single central rib; surfaces naked; sori on the higher pinnae, terminal on narrowed segments; indusium obovate, the base rounded the

valve entire, narrowed towards the apex; receptacle linear, not exerted.

Tropical Asia, China: Szechwan.

Differs from Hymenophyllum polyanthos by narrower and more elongated frond and pinnae sometime deeply pinnatifid only.

9. *Hymenophyllum tenellum* (Jacq.) Kuhn, Fil. Afr. 42. (1868); HKBK. 57.

Adianthum tenellum Jacq., Coll. 3. 287 t. 21 f. 3. 1789.
Hymenophyllum mersum Baker, 1868; NPL. 108.

Rhizomes wide-creeping; stipes 2.5 cm. or less long, slender, naked; fronds 2.5-5 cm. long, 1.8-2.5 cm. broad, oblong-deltoid, tripinnatifid; main rachis winged down to the base; pinnae 4-6-jugate, deltoid, cuneate-truncate at the base on the lower side; lower pinnules 1-2, cleft at tip with ligulate blunt lobes 1 mm. broad; sori 2-6 to a pinna, terminal in the lobes; surfaces naked; indusium with hemispherical lobes and a cuneate entire immersed base.

Ceylon, Madagascar, Mascaren Isles, China: Hupeh, Kwangtung.

10. *Hymenophyllum fuciforme* Sw. Syn. 148, (1806); HKBK. 62; Christ 13; NPL. 109.

Hymenophyllum fucoides Cav., Descr. 275, 1802. (Non Sw. 1801).
Leptocionium fuciforme Presl., 1848.

Stipes strong, erect, 10-20 cm. long, narrowly winged above; fronds 30-60 cm. long, 10-15 cm. broad; triangular-lanceolate, tripinnatifid; main rachis winged throughout; lower pinnae rhomboidal lanceolate cut down nearly to the rachis into numerous distant pinnules on both sides, the lower of which are triangular in outline and again pinnatifid, with 2-3 forked lower segments; sori numerous, very small, placed principally in the axils of the segments; sori numerous, nearly c to the base, rounded, entire; receptacle and even the clusters of capsule often exerted.

South Chili, Juan Fernandez, South China.

11. *Hymenophyllum polyanthos* Sw. Schrad. Journ. 1800^2. 102, (1801); Matthew 370, (1911).

Trichomanes polyanthos Sw. Prod. 137, 1788.
Hymenophyllum abietinum Hk. et Grev., 1829.
Hymenophyllum protrusum Hooker, 1844.
Hymenophyllum viridissimum Fee, 1869.

Stipes 5-7.5 cm. long, slender, wingless; fronds 5-20 cm. long, 2.5-7.5 cm. broad, ovate-oblong, tripinnatifid; main rachis

usually only narrowly winged above; lower pinnae triangular-rhomboidal, divided down to a narrow center into several pinnules on each side, the lowest of which are cuneate or rhomboidal deeply pinnatifid; ultimate segments linear, 2-3 mm. long, less than 1 mm. broad; sori 2-12 to a pinna, terminal or axillary on the segments on both sides; indusium small, divided down nearly to the base; valves ovate or rounded, entire or slightly denticulate.

Widely diffused throughout the Tropical and extending a little beyond Tropical America, African, Tsus-Smia, Japan, Ceylon, Malaya, Java, Formosa, Hongkong, China: Hupeh, Fukien, Kwangtung, Yunnan.

A very variable plant with a dozen of synonyms.

12. Hymenophyllum spicatum Christ, Bull. Geogr. Bot. Man. (1906) 235. c. fig.

A dwarf fern; rhizomes much branched, creeping, interwovened, slender (sometimes capillaceous), rather rigid, clad in brownish pilose scales; leaves close, subcaespitose; stipes 1 cm. long, brown, pilose. Fronds cuneato-flabellate, oblong, 2½ cm. long, ½ cm. broad, obtusely attenuate towards the apex, deeply pinnatifid, with 1 or 2 almost free lobes at base; lobes erecto-patent, about 8 on each side, the lower ones simple, the upper ones forked, 2-5 mm. long, 2 mm. broad, strongly spinoso-ciliate, veins in lobes simple or forked, rigid, black, pilosulous, apex of leaves soriferous, contracted, very shortly lobed; sori about 5 on each side, terminating the margin, almost 2 mm. broad, valves round-ovate, over 2 mm. long, deeply pectinato-ciliate, broadly dehiscent and revolute; sporangia large, reddish to yellowish; texture rather rigid, color olive-green, opaque.

Kweichow.

13. Hymenophyllum omeiense Christ, Bull. Geogr. Bot. Man. 101; (1906); Matthew, 370, (1911).

Rhizomes long-creeping, filiform; stipes short, 2-3 cm. long, filiform, black; fronds ovate, 7 cm. long, 4 cm. broad, sub-attanuate towards base, tripinnatifid, rachis flexuous and vivid brown; pinnae
(3X P. 31).
about 8 on each side, imbriacate, close, rhomboidal-ovate, obtuse, 1 -2 cm. long, 4 mm. broad, sessile, deeply cleft down to a broad wing, lobes rhomboid, close, about 4 on each side, tri- or bilobed, ultimate lobes 2 mm. long, 2 mm. broad, obtuse, veins castaneous, coarse, all clad with sparce rigid brown hairs in the axiles; the margin of fronds very finely denticulato-ciliate; sori terminal on the extreme apex of the lobes, numerous, forming apical panicles, rounded, 1 mm. broad, valves diaphanous, denticulated, often pilose; receptacles included; texture diaphanous subrigid, color light rufo-green.

Szechwan Omei Shan.

May be a form of H. barbatum.

14. Hymenophyllum fastigiosum Christ, Bull. Boiss. 7. 3, (1899); Matthew 370, (1911).

A larger fern than Hymenophyllum barbatum, stipes 1-3 cm. long weak, naked as the other parts of the plant, not or very slightly marginated with wing towards the apex; fronds triangular, elongated towards a long attenuate sharp apex, 8-10 cm. long, 3 cm. broad pinnatifid, rachis winged, pinnae ovale, segments confert, 2-3 mm. broad, very obtuse, spinuloso-toothed; sori placed on thevery elongate apex of the frond, terminal, sessile, ovale, inducium consists of two strongly denticulate valves; receptacle induluced.

The plant sometimes with much strongly undulated margin, thus makes it appears quite different from the type.

Yunnan.

Differs from Philippine H. smithii by short, weak, nonshaggy stipes.

15. Hymenophyllum denticulatum Sw. Schrad. Journ. 1800². 100, (1801); HKBK. 71; NPFL. 112; Matthew 370, (1911).

Leptocionium denticulatum v. d. B., Hym, Jav. 39 t. 29, 1859.
Hymenophyllum humile Nees et Blume, 1823.
Trichomanes neesii Bl., 1828.
Didymoglossum nessii Presl., 1843.
Hymenophyllum nessii Hk., 1844, HSBK. 71 (pt.); Christ 22 (pt.) Npfl. 112.

Stipes 2.5-5 cm. long, erect, naked; fronds ovate-triangular, -tripinnatifid, 2-7.5 cm. long, 2.5 cm. or more broad at the base; rachis margined thoughout, with a slightly undulated wing; pinnae slightly crisped, the lower ones rhomboidal, twice as broad as long, deeply cleft with flabellate or pinnatifid linear segments; sori usually single, placed at the axils on the upper side of the pinnae, sometimes recurved; inducium ovate, divided about two-thirds of the way down, spinose on the back, with serrulated valves.

Formosa, Moulmeni, Malaya, Java, China: Kwangtung, Kweichow, Szechwan.

16. Hymenophyllum barbatum (v. d. B.) Baker in HKBK. 68; NPFL. 110; Matthew 371, (1911).

Leptocionium barbatum v. d. B., Ned. kr. Arch. 5³. 143, 1863.

Stipes slender, erect, naked, 2.5 cm. or less long; fronds oblong-triangular, 3.7-5 cm. long, about 1.2 cm. broad, tripinnatifid; rachis winged throughout; lower pinnae rhomboidal-

oblong, with a broad-winged rachis and short broadly linear spinuloso-dentate segments; sori terminal on the segments of the upper pinnae; inducium suborbicular or broadly oblong; valves divided more than halfway down and deeply spinulose-dentate.
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Tsus-sima, Korea, Japan, Formosa, China: Kweichow, Kiangsi, Yunnan, Szechwan, Hupeh, Anwhei Hwang Shan.

17. *Hymenophyllum henryi* Baker, Journ. Bot. xxvii, 176, (1889); Matthew 370, (1911).

Rhizomes thread-like, wide creeping; stipes very slender, about 2.5 cm. long, faintly winged upward upwards; fronds oblong, tripinnatifid, glabrous 3.7-5 cm. long; pinnae crowded, oblong, much cut away on the lower side at the base; ultimate segments oblong, 1-nerved, sharply serrated, 1 mm. broad; sori many to a pinna, terminal on produced or abbreviated segments; inducium orbicular, cleft down to the base; valves sharply serrated.

China: Hupeh, Szechwan.

Allied to European 4. tunbridgense Smith, but more compound with the habit of small form of 4. javanicum.

18. *Hymenophyllum oxydon* Baker, Job. 272, (1890); Matthew 370 (1911).

Rhizomes very slender, wide-creeping; stipes very short; fronds oblong, bipinnate, glabrous, about 2.5 cm. long, main rachis winged throughout; primary segments crowded, the upper simple, erecto-patent, the lower compound, with a few short confert linear secondary segments, the margin conspicuously toothed throughout; sori several in a frond, terminal or lateral on the ultimate segments; valves of the inducium ovate, serrate.

Hongkong, India, China: Kwangtung.

Allied to 4. tunbridgense to 4. barbatum.

7. Trichomanes Linne, Spec. Plant. 2. 1097, (1753).

Type: Trichomanes crispum L.

Sori marginal, always terminating a vein, more or less enclosed in a tubular inducium at or near the margin of the frond; inducium monophyllous, tubular, corresponding with the frond in texture with a truncate or winged, or slightly two-lipped and more or less dilated mouth; receptacle filiform, elongated, often bristle-like, enclosed or considerably projecting beyond the mouth of the inducium with the sporangia borne at

its base; sporangia sessile, depressed, surrounded by an broad entire nearly transverse ring, bursting vertically. Fronds numerous, fasciculated, erect to pendent and imbricate, mostly conform, subsessile to long-stipitate; blade minute, orbicular, entire and usually flabellate-veined to elongated an several times pinnatifid to pinnate, glabrous, glandular or variously hirsute. Mostly small fern with filmy, often half-pellucid variously lobed fronds of thin dilicate texture, inserted on a creeping or erect often matted rhizomes, thriving best under shade. (Greek. "soft hair", in allusion to the vestiture).

A genus of about 264 species chiefly tropical, common to both the New and Old worlds; 18 recorded in China. It agrees with Hymenophyllum in habit and delicacy of texture, but its tubular cup-like inducium and elongated filiform often long exerted receptacle furnished a distinguishing characteristic.

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Key to species

1. Frond simple or only slightly lobed above, suborbicular; spurious veins present. (Hemiphlebium).

 2. Frond bluntly lobed; inducium distinctly two-lipped.... ....1. T. henzainum

 2. Frond nearly entire; inducium scarcely two-lipped..... ....2. T. hymenoides

1. Frond digitato-subdichotomous (Gonocormus).

 2. Frond cordate at base, to 10 mm. across, segments numerous with rounded apex.......3. T. parvulum

 2. Frond cuneate at base, above 2 cm. long and broad, segments 8-15 repand or bifid apex...................... ....4. T. matthewii

1. Frond pinnately divided, the main rachis winged throughout or towards the base only (Ptilophyllum).

 2. Rhizome radiate; stipes winged only towards the apex.. ....5. T. tereticaulum

 2. Rhizome dorsi-ventral, stipes winged throughout or only towards apex.

  3. Frond sessile, ciliated with reddish hairs......... ....6. T. fargesii

  3. Frond stipitate, not ciliated with reddish hairs.

   4. Stipes not winged.

5. Frond fully bipinnate....7. *T. radicans*

5. Frond fully pinnate.

6. Frond above 15 cm. long..8. *T. auriculatum*

6. Fronds below 10 cm. long.

7. Stipes to 2 cm. long, ultimate segments sharply mucronate.9. *T. makinoi*

7. Stipes above 2.5 cm. long, ultimate segments bifid.......10. *T. bipunctatum*

4. Stipes winged throughout.

5. Stipes none or very short.

6. Fronds about 1.2cm. long; texture membranaceous; mouth of inducium dilated receptacle short.............................11. *T. latemarginale*

6. Fronds much longer.

7. Texture rather coriaceous; tube sunk............................12. *T. intramarginale*

7. Texture membranaceous, tube more or less exerted.............13. *T. humile*

5. Stipes above 2.5 cm. long.

8. Frond below 8 cm. long

9. Frond narrowly linear..................................14. *T. orientalis*

9. Frond ovate-deltoid....................................15. *T. bilabiatum*

8. Frond 20 cm. long...16. *T. naseanum*

1. Frond pinnately divided, the main rachis not winged or winged towards the apex only (Lacostea).

2. Frond simply pinnate; pinnae more or less ovate, rather broad, the base cuneate or rounded..17. *T. javanicum*

2. Frond bipinnate at least; ultimate segments linear or oblong, narrowed, the base neither cuneate nor rounded.............................18. *T. rigidum*

1. *Trichomanse henzainum* Parish; HK. 2 Cent. t. 1. (1860); Hkbk. 75; Npfl. 108.

(P. 34).
Microgonium henzariense v. d. B., 1861.

Stiptes 2-4 mm. long; fronds 6-12 mm. each way, thin in texture, orbicular or obovate-cuneate, bluntly lobed or slightly tending towards palmate; lateral veins rather distant; spurious venules copious; sori 1-6, placed near the center of the outer margin; induсium sunk on the frond, the mouth distinctly two-lipped, receptacle not excerted.

Moulmein, Pegu, Hongkong, China.

An epiphytic litue fern on the trunk of trees.

2. *Trichomanes hymenoides* Hedw. Fil. Gen. et Sp. t. 4. f. 3, (1799); Lindm. Ark. for Bot. 1. 12. (1903).

Trichomanes muscoides Sw., 1801.
Didymoglossum muscoides Desv., 1827.
Hemiphlebium muscoides Prantl., 1875.
Trichomanes apodium HK. et Grev., 1829; HKBK. 75.
Hemiphlebium apodium Prantl., 1857.

Fronds shortly stalked, 2.5-7.5 cm. long, 6-12 mm. broad, varying in shape from linear-oblong to suborbicular, nearly entire or bluntly lobed, especially above; spurious venules faint but copious; sori 1-8, terminal on the lobes, the tube sunk in the frond, the mouth free, dilated; but usually scarcely two-lipped.

A transcontinental species, common in tropical America, Polynesia and Africa, China.

3. *Trichomanes parvulum* Poir. Enc. 8. 64, (1808); HKBK. 75; Christ 27; NPFL. 105; Matthew 391, (1911).

Trichomanes thouarsianum Presl. 1843.

Rhizomes wide spreading, interlaced; stipes 2.5 cm. long, wiry, slender, tomentose below; from 6-12 mm. each way, orbicular in general outline, cuneate or truncate at the base, flabellatedly cut about halfway down from the outeredge in the direction of the base into narrow irregular segments; veins close, prominent, so that the frond when dried appears chanelled or plicate, dichotomous at a very small angle; spurious venules numerous; sori 4-6, terminal on the centeral segments, the tube quite sunk in the frond, the mouth dilated at the sides. The fertile segments or lobes are usually shorter than the sterile ones.

Japan, Java, Polynesian Island, Jobana Islands, Korea, Formosa, Hongkong, China: Kwangtung, Fukien, Kweichow, Chekiang, Hunan.

4. Trichomanes matthewii Christ, Not. Syst. 1. 57, (1909); Matthew 391, (1911).

Rhizomes filiform, tomentose, dark-brown, much branched, creeping fronds solitary or approximately caespitose; stipes pilosulate at the base, filiform, dark-brown, 1-2 cm. long, lamin flabellate, base cuneate, suborbicular or ovate in outline, 2.5-5 cm. long, 2 cm. broad, rarely proliferous at base, incised over ½ way down into 5-6 forked lobes ultimate segments 5-12, often with repand or bilobed apex, 2 mm. broad, 3-4 mm. long, obtuse, entire or minutely crenulate; veins pale green, flabellate, puberulous; inducium one to each lobe, dense, apical, elongate campanulate, immersed strongly dilated at mouth, green, plicate, receptacle sometimes prominent, testure chartaceous; rather firm, color light green or olive-green.

Canton: North River.

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5. Trichomanes Tereticaulum Ching, Sinensia 1: 2 (1929).

Rhizome naked or nearly so, very short, interwovened in dense wiry fibrous roots; stipes densely caespitose-fasciculate, apex, 4-6 cm. long or longer, naked. Fronds glabrous, subdeltoid to linear-oblong, 4-6 cm. long, 2-2.5 cm. broad, 3-pinnatifid, rachis narrowly winged throughout; pinnae 3-5 on each side, remote, erect patent, oblong-ovate, or 2-3 pinnatifid into small linear, entire, rounded segments; texture thin-herbaceous, transluscent, dull green; veins distinct, 1 to each segment, spurious veinlets wanting. Sori terminal on ultimate segments, mostly immersed, 2-3 to each pinna, inducia short funnel-shaped, slightly dilated, obscurely undulate at mouth, not bifid, receptacle long-exerted, stout, dark brown.

A very distinct species for its wiry terete wingless rachis, short radiate rhizome and rather a few remote cuttings, not comparable with any of the Chinese species known to the writer.

Kwangsi.

6. Trichomanse fargesii Christ, Bull. Soc. Fr. 52. Mem. I. 10. (1905); Matthew 391, (1911).

Rhizomes indefinitely log-creeping, flaxuous, ebeneous, clothed with reddish hairs, glabrous at last puniform, broadly scandent; fronds numerous, confert, alternately biseriate, 65 cm. long or perhaps longer; leaves numerous, sessile, ovato-deltoid, acuminate, 10 cm. long, 4 cm. broad, broadest towards base or slightly attenuate, tripinnatifid, rachis winged,

pinnae pectinate-confert, oblong obtuse, 1.5 cm. long, 5 mm. broad, costa winged, pinnules about on each side, deeply dichotomous or flabellate, forked, lobes linear, uninerved, scarcely 1 mm. broad, obtuse; the entire frond ciliate with long reddish hairs. Inducium dense, solitary and terminal on lobes of lower pinnules, shortly pedunculate (peduncle winged) 1 mm. long and broad, borne in the forking of prominent veins, mouth broadly campanulate or patent, receptacle thick, 5 mm. long, exerted.

Szechwan.

7. Trichomanes radicans Swartz, Schrad. Journ. 1800^2. 97, (1801); HKBK. 51 (exl. y.); HPFL. 107.

Trichomanes scandens Hedw., 1799.
Trichomanes kunzeanum HK., 1844.
Trichomanes speciosum Willd., 1810; Christ 30.
Trichomanes repens Schott.; Sturm. 1859.
Trichomanes collariatum v. d. B., 1859.

Rhizomes wiry, wide-creeping, tomentose; stipes strong, wiry, ascending, 5-15 cm. long, naked or nearly so, sometimes the upper parts winged, fronds 10-30 cm. long, 5-15 cm. broad, tripinnatifid, main rachis very narrowly winged, often free, except near the apex; lower pinnae 2.5-10 cm. long, ovato-rhomboidal, cut down to a narrowly-winged rachis; pinnules again deeply pinnatifid, ovate-rhomboidal with deeply toothed lower segments; texture membranaceous but firm; a single vein only carried into each ultimate segment, sori lateral, 1-4 to a pinnule, the tube small, subcoriaceous, more or less decidedly exserted, the mouth very slightly two-lipped; receptacle slender, elongated.

A variable species, diffused all over the tropics of the world; India, Japan, China: Fukien, Kweichow, Szechwan Omei Shan; Chekiang- Ningpoo.

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Var. anceps Clarke, Tr. Lin. Soc. II. Bot. 1. 441; (1880); Matthew 391, (1911).

Trichomanes anceps Wall., List n. 166, 1828.

Frond smaller; stipes often winged to the base, primary segments pinnatifid or somewhat 2-pinnatifid; lips of the inducium slightly broader than the tube.

India, Loochoo, China: Kwangtung, Yunnan.

8. Trichomanes aruiculatum Blume, num. 225, (1828); HKBK. 82; Christ 29; HPFL. 107; Matthew 391, (1911).

Cephalomanes auriculatum v. d. B., Hym. Jav. 34 t. 25.
Trichomanes dissectum J. Sm., 1841.
Cephalomanes dissectum v. d. B., 1859.
Trichomanes belangeri Bory., 1835.

Rhizomes strong, wide-creeping, tomentose; fronds nearly sessile, 15-30 cm. long, 3.7-5 cm. broad, bipinnatifid, rachis wiry, very slightly winged throughout or above only; pinnae shortly stalked, ovate-rhomboidal, obliquely cuneate at the base, irregularly pinnatifid halfway down or more, the lowest anterior lobe often considerably prolonged beyond the others; texture subcoriaceous; venation close, flabellate; sori 2-18 to a pinna, the tube quite exerted the mouth truncate, slightly dilate, receptacle filiform, long exerted, about 4 mm. as long or longer than the tube.

Japan, Formosa, North Hindustan, Philippines, Java, Guiana, China: Hainan, Hunan, Yunnan, Szechwan, Kwangtung, Chekiang -yung-tan Shan.

It is interesting to not that this tropical species can extend as far north as eastern Chekiang, where the snow fall in winter is known fairly heavy.

9. Trichomanes makinoi C. Chr. Ind. 684 (1906).

Trichomanes acutum Makino, Bot. Mag. Tokyo 13, 47, 1899; Christ, Bull. Boiss. 4. 775. 1890 (non Presl. 1843).

Rhizome horizontally wide-creeping, filiform, fuscous-black, tomentose, with loosely short roots. Stipes laxly placed on the rhizome, very short to the longest ones being about 2 cm. or more long, tomentose at the base, margined with the wings gradually broader above, frond small, delicate, ovate, or narrowly ovate, 2/3-3 cm. long, 3/5-2 cm. ~~b~~ or more broad, subflabellato-bipinnatifid or sometimes subtripinnatifid, thin, subdiaphanous, almost naked, darker yellowish-green when dry, more or less crisped; main archis broadly winged; pinnae erect-patent, a few or several on each side, sessile, cuneate-ovate or narrow, pinnatifid or subflabellate into narrowly deltoid very sharply acute and erect-patent segments which are rarely bifurcate in the lowest, furnished with numerous oblique spurious venules. Sori only one to a pinna, axillary, compressed, naked, the tube sunk in frond, subdeltoid, tapering below, distinctly 2-lipped; lip dilated, ovate-deltoid, obtuse at the apex, equal to or a little shorter than the tube, with irregular spurious vein near the margin; receptacle columnar, exserted, straight;sporangium with large ring.

Japan, China:

A little fern, characterized by shaply mucronate segments with obscurely and irregularly undulate margin.

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10. *Trichomanes bipunctatum* Poir. Enc. 8. 69, (1808); Christ 32; NPFL. 105.

Hymenophyllum filicula Bory., Willd. 1525, HBK. 51; Matthew 391, (1911).
Didymoglossum filicula Desv., 1527; v. d. B. Hym. Jav. 35 t. 25.
Didymoglossum latealatum v. d. B., 1863.
Trichomanes lateralatum Christ, 1896.
Trichomanes striatum Mett., 1825.
Trichomanes plicatum Bedd., 1868.

Rhizomes wide-creeping, tomentose, rather slender; stipes 2.3-5 cm. long, naked, slightly winged above; fronds 2.5-10 cm. long, 3.7-5 cm. broad, ovate (tripinnatifid, main rachis with a very narrow wing or free below, pinnae ovate-rhomboidal pinnatifid down to a narrowly winged rachis, the lower pinnules again deeply pinnatifid, down to a narrowly winged rachis, the lower pinnules again deeply pinnatifid; ultimate segments linear; texture firm, membranaceous; a central costa in each segment, spurious venules none or indistinct sori1-4 to a pinna, axillary or terminal on the segments; tube sunk or somewhat exerted, the mouth very distinctly two-lipped, the lips triangular with a rounded apex, often reflexed, receptacle not or very shortly exerted.

Common throughout Tropical Asia; Formosa, Korea, Japan, Hongkong, China: Kwangtung.

A variable species of which Van den Bosch divided into quite a number of species (cf. Hym. Jav. 1861).

11. *Trichomanes latemarginale* Eaton, Prc. Amer. Acad. 4. 111, (1858); HBK. 79; NPFL. 105; Matthew 391, (1911).

Rhizomes slender, wide-creeping, tomentose; stipes none or scarcely any; fronds about 1.2 cm. long, 6-12 mm. broad, sub-orbicular or oblong-rhomboidal, pinnatifid; main rachis with a wing about 2 mm. broad; segments linear, close, simple or once forked; substance membranaceous, surfaces naked; a central costa only in each segment, but the margin thickened; sori 1-3, terminal on the upper segments, tube sun, mouth dilated, two-lipped.

Japan, Hongkong, China: Fukien.

12. *Trichomanes intramarginale* Hook. et Grev. Ic. Fil. t. 211. (1831); HBK. 79; NPFL. 105; Matthew 391, (1911).

Didymoglossum intramarginale Presl., 1848.
Crepidomanes intramarginale Presl., 1849.

Rhizomes slender, wide-creeping, tomentose; stipes very short; fronds 2.5-5 cm. long, 6-12 mm. broad, oblong-rhomboidal, deeply bipinnatifid, tapering gradually below, central portion 2 mm. broad; segments few, erecto-patent, linear, simple or forked; of coriaceous texture, opaque, somewhat crisped when dry; a central costa only in each segment, but the margin thickened; sori 1-4 to a frond, terminal or axillary on the upper segments similar to sterile, tube sunk, mouth not dilated, with a rather long projecting bristle.

A small dense matted half-pellucid fern.

Ceylon, Hongkong, Japan.

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13. Trichomanse humile Forst. Prod. 84, (1786); MKBK. 80; HK. ex. Ic. Fil. t. 35; NPFL. 105; Matthew 391, (1911).

Crepidomanes humile v. d. B., Hym. Jav. 16 t. 11. 1861.
Trichomanse endlicherianum Presl., 1848.
Trichomanes minutulum Gaud., 1827.
Trichomanes erectum Brack., 1854.
Trichomanes aureum v. d. B., 1863.

Rhizomes creeping, deeply intermated; stipes 6-12 mm. long, slender, winged above; fronds 2.5-5 cm. long, 1.2 cm. broad, -bipinnatifid, lanceolate-oblong in general outline, cut down to a narrowly winged rachis; segments pinnatifid with simple or once forked linear-lobes; substance membranaceous, surface and margin naked; a central costa only in each segment; no spurious venules; sori solitary, on the upper side of the pinnae, tube more or less exerted the mouth spreading, two-lipped;

Java, New Zealand, Formosa, Hongkong, China: Kwangtung.

14. Trichomanes orientalis C. Chr. Ind. 646, (1906); Matthew 392, (1911).

Trichomanes japonicum Franch. et Sav., Enum. Pl. Jap. 2. 207. 618, 1879 (non Thunb. 1784 nec. Poir. 1808).

Rhizomes creeping, blackish, densely pubescent; stipes 5 cm. long, wing extending almost down to the base; lamina dark green when dry, thin membraneous, narrowly lanceolate, acute, about 7.5 cm. long, 3-3 cm. broad, rachis marginated with broad wing; pinnae subapproximate, 4-5 on each side, the lower ones slightly remote, alternate, broadly ovate, subpinnate, the ultimate lobes [illegible] mm. broad, obtuse; intramarginal spurious veinlets none; sori immersed, numerous; indusium oblong, cyathiform, dilated, truncate, scarcely bilaterate, receptacles exerted piliform.

Japan, Himalayas, Formosa, Korea, China: Kwangtung, Yunnan, Kweichow.

15. Trichomanes bilabiatum Nees et Bl. Nova Acta 11. 123 t. 13. f. 2, (1823).

Didymoglossum bilabiatum v. d. B., 1856.
Didymoglossum laxum v. d. B., 1861.
Trichomanes brevipes Baker, HKBK. 84; NPFL. 107.
Trichomanes melanorhizon HK., 1846.

Rhizomes tomentose, with numerous short-branched rootlets; frond 5-7.5 cm. long, 2.5-3.7 cm. broad, ovate-deltoid, fully pinnate, or rachis slightly winged at the apex; pinnae spreading, ovate, cut down to a very narrowly winged rachis; lowest pinnules again deeply pinnatifid, with narrow linear segment, 2 mm. long, [illegible] mm. broad; texture membranaceous a single costa only in each segments; sori 2-8 to a pinna, axillary, tube more or less exerted, mouth with two large rounded lips.

Philippines, Malesia, China: Kweichow,

New to China.

16. Trichomanes nasoanum Mss. Herb. Matsumura, Christ, Bull. Soc. Fr. 52. Mem. I. 11, (1905); Matthew 391, (1911).

Rhizomes strong creeping thick as raven's quill, covered with atratous subulate adpressed scales, and long fibrous root which are covered by the similar scales. Stipes 12-20 cm. long, woody, strong, narrowly winged toward base; lamina 20 cm. long, cm. broad, ovate-elongate; the lower pinnae diltoid-ovate, acuminate, 6 cm. long, 2 cm. broad; pinnules and segments imbricato-confert, pinnules cut down
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to the midrib rarely deeper into almost 4 ovate, ligulate-obtuse or acute segment; inducium very minute, placed in the axils near the base of the upper pinnules, 1 mm. long, 1 1/3 mm. broad, exerted, color dark green.

Loochoo, China: Kweichow, Szechwan - Omei Shan.

Scarcely distinct from T. orientale C. Chr. The receptacles are exerted.

17. Trichomanes javanicum Blume, Enum. 224, (1808); HKBK. 85; Christ 29; NPFL. 107; Matthew 391, (1911).

Cephalomanes javanicum Presl., 1848; v. d. B. Hym. Jav. 30 t. 22.
Trichomanes curvatum J. Sm., 1841.
Lacostea javanica Prantl., 1875.
Cephalomanes zollingeri v. d. B., Hym. Jav. 31 t. 25.
Trichomanes boryanum Kze., 1847.
Lacostea boryanum Prantl., 1775.

Caudex tufted, with numerous strong wiry roots; stipes 2.5-10 cm. long, wiry, erect, naked or villose; fronds 5-20 cm. long 2.5-5

cm. broad, ovate-lanceolate, acuminate, once fully pinnate; lower pinnae often 2.5 cm. long, 6 mm. broad, oblong, obtuse or acute, obliquely cuneate at the base, finely toothed; texture subcoriaceous; veins numerous, close, central costa not clearly marked or continuous to the apex; sori 1-4, placed in the axils of linear segments on the upper side of the pinnae, tube free, the mouth broadly dilated but not two-lipped; receptacle much exerted.

Tropical Hindostan, Malayas, Borneo, Java, Formosa, Loochoo, Polynesian Islands, China: Hainan.

In China this species was recorded only from Hainan.

18. Trichomanes rigidum Swartz. Prod. 137, (1788); HKBK. 86 (pt.); Christ 30; NPFL. 107 (pt.); Matthew 391, (1911).

Trichomanes bifidum Vent.; Willd. 1810.
Trichomanes daucoides Presl., 1849.
Trichomanes compressum Desv., 1811.
Trichomanes degei v. d. B., 1859.
Trichomanes seemanni Carr., 1873.

Rhizomes short; stipes tufted, erect, stiff, 5-20 cm. long, naked or very slightly winged above; fronds 5-20 cm. long, 5-15 cm. broad, deltoid or ovate-acuminate 3-4-pinnatifid, the main rachis usually only slightly winged towards the top; lower pinnae 5-7.5 cm. long, erecto-patent, ovate or lanceolate-rhomboidal, cut down to a rachis which is very narrowly winged throughout or free below; pinnules lanceolate, deeply pinnatifid with deeply toothed or even irregularly pinnatifid into linear lobes with sharpe apex, texture subcoriaceous, color dark green, nearly black when dried, nearly naked, often slightly crisped; sori 2-12 to a pinnule, small, axillary, the tube scarcely sunk, the mouth slightly dilated receptacle exert together with a part of sori mass.

Tropical America, Mexico, Polynesia, Japana, Malaya, South India, Ceylon, Natal, Cape ~~¢ ɗ~~ Colony, China.

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Family IV. Cyatheaceae.

Sori globose or ellipsoid, dorsal or terminal in the veins; sporangia numerous sessile or stalked, furnished with a complete, oblique (subvertical) ring, which is sometimes interrupted at the place of the stomium by a row of depressed, transversally oblong cells; stomium opening at right angles to the ring; receptacle often elevated. Indusium wanting or more generally present and then scale-like, 2-valved, subcupuliform or globose, but then afterwards evanishing or becoming cup-shaped, sometimes consisting of a whorl of hairs or fibers, always fastened beneath the sori (inferior). Caudex arborescent, sometimes subarborescent. Fronds often very large, mostly compoundly divided; veins free or the costal ones sometimes anastomosing in Hemitelia (not in China).

7 genera, tropical and subtropical, 3 represented in China, namely; alsophia, Cya~~h~~thea and Cibotium.

Key to genera

I. Sori dorsal, placed on the back or at the forking of a vein. Inducium inferior, round to cup-shaped and often split irregularly when ripe, or scaly or wanting. Annulus not interrupted by a r~~p~~ow of depressed cells...Trib I. Cyatheae

A. Sori indusiate.

1. Inducium distinct, globose, quite enclosing the sorus when young, bursting down irregularly, finally evanishing or becoming more or less cup-shaped. Receptacle central.............8. Cyathea

2. Inducium spurious, consisting of scales placed at the inner side of the receptacle, or of a circular, entire or lobed scales or whorl of fibres with the receptacle in the centre..9. Alsophia

B. Sori exindusiate...................9. Alsophia

II. Sori terminal on the veins. Inducium extrorse, formed of the more or less modified lobes of frond-edge, hood-like involucre to the sorus. Annulus interrupted by a row of depressed cells at the place of stomium...Tribe II. Dicksonieae

A. Inducium 2-valved, the outer valve consisting an unmodified cucullate lobe of the frond, forming with the inner valve a saccate involucre to the sorus (not Chinese)..............................(Dicksonia).

B. Indusium 2-valved, the outer valve like the inner one, distinctly differentiated from the margin of the frond, both forming a saccate involucre to the sorus...103. Cibotium

8. Cyathea Smith Mem. Acad. Turin. 5. 416. (1793).

Type: Polypodium arboreum L.

Sori borne on veins, or in theaxil of the forking of veins. Receptacle elevated globose, or elongated, inducium globose, inferior, covering the whole sorus, afterwards breading at the summit and forming a more or less persistent cup, even or irregular on the margin. Stipes often acaulescent, but species with trunks 6-10 m. high being not uncommon. Fronds simple pinnate or decompound. (Greek, "a cup", alluding to the inducium).

(P. 40).

Key to species

1. Stipes and rachis dark purple, aculeat with long spines; frond glabrous, except the costule beneath clad with bullate scales..............................1. *C. spinulosa*

1. Stipes and rachis lighter colored or stramineous green, clad in costa beneath.......................2. *C. austrosinica*

1. *Cyathea spinulosa* Wall, List n. 173, (1828); Hk. Sp. 1. 25 to 12 c, (1844); HKBk. 23; Christ 321; NPFL. 127; Matthew 352, (1911).

An arborescent fern. Stipes and rachis strongly aculeated, often dark purple. Fronds glabrous, ~~ap~~ ample, subflaccid, tripinnatifid, rachis stout, about 2 cm. across, prickly spiny and densely chaffy scaly throughout, clad near the base with long (1.5-2 cm.) lanceolate subulate dark purple stiff scales, pinnules oblong, acuminate, to 10 cm. long, 1.5-1.8 cm. broad, pinnatifid nearly down to the rachis; lobes acute, 8 mm. long, 2-2.5 mm. broad, serrulate with small bullate scales on the costules beneath; sori copious, 3-4 in a row on each side of the costule, globose, close to the costule, extending a little over the length of the lobes; indusium globose, very thin, membranaceous, fragile, soon breaking up irregularly.

Continent of India, Assam, Southern Japan, Formosa, Loochoo, Hongkong, China: Kwangtung, Kweichow.

A fairly common fern in southern China, mostly in wooded ravines.

2. *Cyathea austrosinica* Christ, Bull. Geogr. Bot. Man. 190; (1910); Matthew 353, (1911).

Ample tree fern; principal rachis thick like a man's finger, stramineous-green, glabrous, lucente, clothed with short aculeate pustulae. Fronds tripinnatifid; pinnae petiolulate, 50 cm. long, 15 cm. broad, acuminate, base scarcely narrowed, rachis strigoso-pubescent and pustulate, sulcate, dark-stramineous; pinnae sessile, rather remote, about 20 on each side, erecto-patent, the lower ones deflexed, caudate-acuminate, cut to a very narrow wing on each side, 6 cm. long, 15 mm. broad; segments close but separate by obtuse sinuses, about 20 on each side, ligulato-oblong, obtuse or apiculate, serrate, 6 mm. long, 2 mm. broad, costa strigoso-pubescent beneath, the upper surface glabrous, veins about 5, mostly furcated from the base, conspicuous; sori costular, close, minute, about 6 on each side, receptacles black, raised glabrous, brown, indusium brown, fragile, rigid, soon split open with lacerate edge.

Kweichow.

9. Alsophila R. Brown, Prod. Fl. N. Holl. 158, (1810).

Type: Polypodium extensum Forst.

Sori globular, dorsal on veins or in the forking of a vein; receptacle mostly elevated, frequently villous; indusium none, except, in a few species, a minute indistinct membrane or scale at the base of the sorus. Fronds usually large, bi-tri-pinnate very rarely simply pinnate to 5 ft. tall; veins simple or forked, free. (Greek, "grove-loving").

A considerable large genus in tropics with about 200 species of mostly arborescent forms resembling in general habit Cyathea and Hemitelia, but destitute of indusium. The stipes attaining considerable thickness in the form of a trunk of different height, with a tuft of large fronds crowning its top, making the fern a pleasing sight in open warm countries as well as in choice large conservatories.

11. species known in China.

Key to Species

1. Frond usually simply pinnate; pinnae entire or crenate.......................................1. *A. podophylla*

1. Frond bipinnate; secondary pinnae pinnatifid or deeply crenate.

2. Lateral veins in segments simple.

3. Plant to 75 cm. long, with slender stipe; pinnae to 15 cm. long........................2. *A. denticulata*

3. Tree fern of much larger dimension, with thick caudex; pinnae over 30 cm. long.

4. Pinnules pinnatifid ¾-- way down into triangular or rounded serrate segments...3. *A. glabra*

4. Pinnules only deeply crenate...4. *A. rheosora*

2. Lateral veins in segments forked.

3. Segments shallowly serrate, rachis and midrib above shortly pubescent.

4. Pinnules 2-2.5 cm. broad short-petiolate segments 3 mm. broad; veinlets distinct below...5. *A. henryi*

4. Pinnules below 1.3 cm. broad, sessile, segments 3 mm. broad; veinlets not distinct below.

5. Rachis smooth..........6. A. confucii

5. Rachis prickles.......7. A. chinensis

3. Segments entire or at most obscurely crenate.

5. Underside of the frond glaucous.................
..........................8. A. glauca

5. Underside of the frond green.

6. Under side of segment more or less greyish scaly.

7. Interstices of sori densely filled up with white ragged scales.......................
.....................9. A. tomentose

7. Costules between sori only sparsely greyish scaly...............10. A. latebrosa

6. Underside of segments entirely naked........
.......................11. A. costularis.

1. Alsophila podophylla, Hooker Journ. 9, 334 (1857); Hk.Bk. 43; Benth. Fl. Hongk. 470, (1861)., Christ 355; [illegible] 134; Matthew 341, (1911);

Cyathia podophylla Copel, 1909.
Cyathea bonii Christ, 1890.

Trunk 1.5-2.5 m. high. Frond attaining 2.7-3 m. in length, twice to 4 times pinnate; stipes glossy, often rough with minute raised points, the base thick, sometimes muricate and bearing black scales. Ultimate pinnules or segments lanceolate, acuminate, the large ones 10-12.5 cm. long, sinuately toothed, truncate at the base and shortly petiolate, all diminishing upwards and passing into the pinnatifid apex. Veinlets after united in the more entire pinnules towards the margin, bearing a sorus near their base and consequently parallel with the primary veins. Sori rather small, globose, scattered, the sporangia very closely packed.

Siam, Loochoo, Chusan, Hongkong, China: Kwangtung.

(P. 42).
2. Alsophila denticulata Baker, Jou. 102, (1885); Matthew 341, (1911).

Cyathia hancockii Copel, 1909.

Stipites about 30 cm. long, bright brown, clothed towards the base with abundant bright brown lanceolate paleae. Fronds moderately firm in texture, green on both surfaces, densely hairy

on the ribs above, glabrous, but clothed with copious minute ovate bullate scales on all the veins beneath, ovato-deltoid, 45 cm. long, tripinnatifid, but fertile also in a bipinnate form; lower pinnae of the tripinnatifid form the largest, distinctly petioled, lanceolate-deltoid, 10-13 cm. long, 2-3.1 cm. broad, lower pinnules distinct, sessile, lanceolate, pinnatifid, with oblong, tertiary segments; ultimate segments oblong, 2-2.5 mm. broad, conspicuously inciso-crenate; veining pinnate in the final segments; veinlets distinct, simple, erecto-patent; sori brown, medial, superficial; receptacle but little elevated.

North Formosa, China: Canton.

3. Alsophila glabra Hooker, Sp. I. 51; HKBK. 45; Christ 326; BPFL. 136.

Gymnosphaera glabra Blume, 1828.
Polypodium giganteum Wall, 1828.
Alsophila [illegible] Hance, 1868.
Cyathea glabra Copel, 1909.
Aspidium lamprocaulis Christ, Bull. Geogr. Bot. Mans. 117, 1906.
Dryopteris lamprocaulis C. Chr., Ind. Suppl. I. 34. 1913.

Stipes asperous, paleaceous at the base, and, as well as the main rachises, purplish-ebeneous, polished; fronds sub-coriaceo-membranaceous; primary pinnae 45-60 cm. and more long, deeply pinnatifid at the apex; pinnules upper ones sessile, lower ones petioleted, from a truncated base, oblong-acuminate, 10-15 cm. long, 1-1.9 cm. broad, pinnatifid [illegible] way to the costule, rarely more; lobes triangular or rounded, rarely ovate, serrated; veins pinnate; veinlets all simple; sori on most of the lobes, generally arranged in the shape of a V inverted, not extending to the apex of the lobe.

Tropical Asia, Java, Malayas, Ceylon, throughout India, China: Kweichow, Hainan, Szechwan.

Dryopteris lamprocaulis (Christ) C. Chr. is a young robust form of the wide-spread Alsophila glabra.

Var. Cavaleriana Christ, Bull. Geogr. Bot. Man. [illegible]. 140, (1910); Matthew 341 (1911). Differs from the type in sterile veins being impressed often [illegible] diversed.

Kweichow: Pin-fa.

4. Alsophila rheosora Baker, Jot. 262, (1890); BPFL. 136; Matthew 341, (1911.

Trunks 3 m. high; fronds ample, deltoid, bipinnate, moderately firm in texture, green and glabrous on both surfaces; rachis brown, without either paleas or prickles; pinnae oblong-lanceolate, reaching a length of 45-60 cm. and a breadth of 18-20 cm.

pinnules lanceolate, deeply crenate, 1.3-1.9 cm. broad, truncate at the base, the lower distinctly petiolate; main veins 0.3 mm. apart; veinlets simple, ascending, 4-5-jugate; sori crowded, close to the main veins in rows, falling short of the edge of the pinnules.

Allied to Alsophila glabra and Alsophila podophylla.

Cochinchina, China: Yunnan.

(P. 43).
5. Alsophila henryi Baker, Kew Bull. 229; (1898); Matthew 341, (1911).

Alsophila rheosora Christ, 1898.

Caudex 1.5-6.5 m. long; lamina ample, tripinnatifid, moderately firm, green and glabrous on both surfaces; pinnae oblong-lanceolate, 60-75 cm. long, 25-35 cm. broad, rachis castaneous, pilose above, nitid below; pinnules lanceolate, sessile, lower ones 12-13 cm. long, 2.5-3 cm. broad, profoundly-pinnatifid; tertiary segments linear-oblong, dentate, 0.4 cm. broad; the veins of the segments 9-10-jugate, conspicuous erecto-patent, all or mostly simple, the lower sometimes forked; sori superficial, globose, medial between costa and margin.

Yunnan.

Differs from Alsophila oldhami Bedd. by ultimate segments twice as broad, distinctly dentate, veins 9-10-jugate, sori medial and larger.

6. Alsophila conuseii Christ. Bull. Geogr. Bot. Mag. 102, (1906); Matthew 341, (1911).

Cyathea conuseii Copel, 1908.

A stately ample tree fern with trunks reaching 2 m. tall and frond 1 2/3 m. long. Rachis shining, thick, brick-red, aculeate, naked; pinnae sessile, 45 cm. long, 15 cm. broad, oblong, acuminate, base scarcely attenuate; pinnules close, about 25 on each side, sessile cut down to rachis into a narrow wing 1 mm. broad, abruptly acuminate, 8 cm. long, 17 mm. broad; segment close, about 17 on each side, falcato-acuminate, lanceolate, 3 mm. broad, denticulate, veins about 12 on each side of the costule, bi- or trifurcate from base, oblique, upper surface obscurely green, naked, the lower pale green, with sparse ochraceous minute scales; sori in the specimens studied deciduous, close to costules of segments and placed at the base forked veins; receptacle obscurely punctiform, scarcely elevated, provided with minute scaly white membranes.

Szechwan: Omei Shan, rare.

7. Alsophila chinensis (Copel) Ching.

Cyathea chinensis Copel), Phil. Journ. Sci. Bot. III. 355, (1909); Matthew 353, (1911).

Trunk to 6 m. tall; frond large, rachis almost glabrous, not prickled apiculate; the largest pinnae sessile, acuminate, rachis stramineous, sparcely pilolose beneath covered with dense purplish-red adpressed hairs above; pinnules sessile, 7 cm. long, 14 mm. broad, serratecaudate, deeply pinnatifid, with acute sinuses; costa fuscous-pilose above, covered very sparingly and irregularly with hyaline hairs and minute paleae; veinlet on each side 7-9 and mostly forked, incon-spicuous, segments 3 mm. broad, subfalcate, obtuse, serrulate, texture herbaceous, green above, slightly paler at the base of segments, small each subtended by one or two yellowish brown scales; induclum almost no.

Yunnan,

A form of alsophosa costularis Baker. Christ regards this not very distinct from his A. Confucii, but besides the presense of the copious enough hyaline hairs, it differs in the absence of prickles on the rachis and in the pinnules which are decidely more truncate at the base and less pale beneath and the obtuse segments with inconspicuous veinlets and the collector's notes indicate that this is a much larger plant. --- Copeland.

8. Alsophila glauca (Bl.) J. Smith, Job. 3, 319, (1841).

Alsophila contaminana Wall, HKBK. 41; Christ 327; NPFL. 136; Matthew 341, (1911).
Chncophora glauca Blume, Enum. 243, 1828.
Cyathea contaminana Copel., 1909.

Stipes and rachis paleaceous at the base, purplish brown, glossy, aculeate with short prickles tipped with a gland. Frond ample, coriaceous, glabrous, black-green above (when dry), glaucous beneath; primary pinnae 61 cm. and more long, oblong-ovate, acuminate; pinnules sessile, 10-13 cm. long, 1.3 to nearly 2.5 cm. wide, deeply, near to the costule, pinnatifid, linear-oblong, subfalcate, entire, the fertile ones often more contracted with margins (when dry) revolute, obscurely crenate; veins once or twice forked; sori nearer the costule than the margin; a minute shallow-lobed and cut membrane surrounds the base of the receptacle after the capsule are falling.

Tripical Asia - Java, Malaya, Cachar, Formosa, China: Hainan (McClure 1921).

9. Alsophila tomentosa (Bl.) Hooker, Sp. I. 55 (1844); HKBK. 42; NPFL. 138; Matthew 342, (1911).

Chnoophora tomentosa Bl., 1828.
Alsophila lepifera J. Sm., 1841.

Scarcely hairy or villose on any part; stipes and main rachis polish brown, strongly muricated with short spines tipped with a black glad. Fronds coriaceous, blackish green above, on the lower side copiously cobwebby scales, which fill up all the interstices of the copious sori, which together cover the whole surface of the fronds of the specimen described.

Java, South Comarines, Formosa, Hongkong, not seen yet in adjoining countries.

A common tree fern in Hongkong up to 18 ft. tall with a single straight trunk 15 cm. or more in diameter terminated by a tuft of spreading airy green large fronds. A very pretty fern.

Said to be naturalized in the Island of Hongkong.

10. Alsophila latebrosa Wall.; Presl. Tent. 62, (1836); Hk. Sp. I. 37 (1844); Christ 327; NPFL. 136; Matthew 341, (1911).

Chnoophora tomentosa Bl., 1828.
Alsophila lepifera J. Sm., 1841.

Scarcely hairy or villose on any part; stipes and main rachis polish brown, strongly muricated with short spines tipped with a black glad. Fronds coriaceous, blackish green above, on the lower side copiously cobwebby scales, which fill up all the interstices of the copious sori, which together cover the whole surface of the fronds of the specimen described.

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10. Alsophila latebrosa Wall.; Presl. Tent. 62, (1836); Hk. Sp. I. 37 (1844); Christ 327; NPFL. 136; Matthew 341, (1911).

Polypodium latebrosa Wall., 1828.
Dichorexia latebrosa Presl., 1848.
Hemitelia latebrosa Mett., 1856.

Stipes aculeat at the base, muricated upwards dark mahogany-brown in color; primary pinnae oblong-acuminate, 30-35 cm. long, 15-20 cm. broad; pinnules lanceolate-acuminate, 7.5-10 cm. long, 1.3 cm. broad, cut down nearly to the rachis into numerous linear oblong, blunt, slightly-toothed lobes on each side; texture herbaceous, upper surfaces dark-green, naked, lower surface naked or slightly hairy and scaly; veins all once forked; sori

elevated, conspicuous, occupying often the lower two-thirds of the segments.

A common tree fern in India, Malayas, Formosa Philippine and recently discovered in China: Yunnan.

(P. 45).
11. *Alsophila costularis* Baker, Kew Bull. 5, (1906); Matthew 341, (1911).

Caudex to 7 m. tall; lamina ample, deltoid, tripinnatifid, under surface pale green never glaucous, ultimate costas of pinnules glabrous; primary rachis stout, unarmed, naked, pale greenish-brown; pinnae oblong-lanceolate, sessile, 60 cm. long; pinnule lanceolate, sessile, the lower ones 9-10 cm. long, 1.4-1.7 cm. broad, pinnate toward the base, the tertiary lobes linear-oblong, 0.3 cm. broad, slightly serate; veins 10-12-jugate profoundly furcated; sori costulate, placed near the base of the veins, never confert.

Yunnan.

Resembling Alsophila glauca in habit and pinnae, differs by the costas of~~p~~ pinnules being pilose on the under surface and sori placed costulately.

10. Cibotium Kaulfuss, Jahrb. d. pharmacie XXI. 53. (1820). conf. Christ, Phil. Jo. Sci. Bot. II, 117, 1907.

Type: Cibotium chamissoi Kaulf.

Sori contained in a prominently coriaceous deeply 2-valved cup-shaped inducium, of which the outer valve distinct from the substance of the frond. Fronds coriaceous, large, twice pinnate, veins free. Rhizomes thick, creeping. (Greek, "a little seed-vessel").

A small genus of about 10 a~~b~~rborescent species principally confined to eastern Asia, the Pacific Islands and tropical America, with but one species extending as far north as Canada. It differs from Dicksonia, which so far is unknown in China, in having the coriaceous outer valve of the inducium being distinct from the substance of the leaf, not formed by the apex of the segment as in Dichzonia.

2 species are known from China.

Key to species.

1. Sori 2 or more on~~e~~ each side of the segments....1. *C. barometz*

1. Sori 1 on each side of the segments............2. *C. cumingii*

1. Cibotium barometz (L.) J. Smith, Lond. Job. 437. (1842); Christ 315; NPFL. 121; Matthew 353, (1911).

Polypodium barometz L. Sp. 2. 1092, 1753.
Dicksonia barometz Link, 1841, MKBK. 49.
Scythian-Lamb.
Cibotium baromtz Christ, Phil. J. Sci. Bot. II, 117, 1907.
Balantium glaucescens Link, 1841.
Cibotium assamicum HK., 1844.
Dichsonia assamicum Griff., 1841.

Arborescent; frond bipinnate; lower pinnae ovate-lanceolate 30-60 cm. long, 15-30 cm. broad, pinnules linear-acuminate, cut down with/on a short distance of the rachis above, and sometimes quite down to it at the base; segments linear-oblong, acute, subfalcate, upper surface naked, shinning, lower glaucous, sometimes furfuraceous; veins prominent lateral veins of segments rarely forked, sori 2-4 to each segment, the valves concave, the outer one slightly larger than the inner one or nearly equal, transversely oblong.

Assam, Malayan Peninsular, India, Philippine, China: Kwangtung, Chekiang, Fukien Kweichow, Yunnan, Kwangsi.

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The number of sori to each segment and venation is very variable even on the same plant. This plant was found by the author for the first time growing under wood in the vicinity of Wenchow, S. Chekiang, where it was by no means common and is probably the northern extremity in the geographical distribution of this species.

2. Cibotium cumingii Kze. Farnk. 1. 64, (1941); Miq. Verh. Nederl. Inst. III. 4. 46 t. 5, 1851; Christ l. c. 118.

Cibotium barometz J. Sm. var. cumingii (Ktz.) C. Chr., Ind. 183, 1906.

Like C. barometz, but the pinnae usually narrower, the segments shorter and proportionally broader, the veins forked, with but one sorus on each side.

There are intermediate forms between the present species and Cibotium barometz, so this species may just well be reduced to a variety of barometz as some anthorities have cosidered.

Family V. Polypodiaceae

Sori definite, marginal, submarginal or dorsal, various in shape, punctiform, round, oblong, reniform or linear, often indefinite and consisting of numerous sporangia crowded densely over the under surfaces of the fronds. Sporangia usually stalked, provided with a longitudinal, incomplete ring of thickened cells, interrupted by the stalk (except in Plagiogyria, which has the capsule of Cyatheae), opening by a transversed stomium. Indusium

wanting or present, various in shape and size. Prothallia green. Terrestrial, epiphytic or aquatic, rarely arborescent plants with creeping or erect, rhizomes. Fronds various in shape, size and appearance, sometimes, dimorphous, coiled in vernation, erect, spreading or pendulous; blades simple, once-pinnatifid or several times pinnatifid or pinnate or decompound; veins free or anastomosing variously.

The largest of the families of ferns, including about 140 genera and nearly 6000 species. It is represented in Arctic, Temperate and Tropical Regions of the both Hemispheres; 68 genera are represented in China.

Key to Tribes of Polypodiaceae

1. Sori generally inducíate; inducium free from the margin or consisting of the reflexed or recurved, modified margin or portion of the margin .
   2. Inducium inferior.
      3. Fronds uniform......................Tribe I. Woodsieae
      3. Fronds dimorphous, the fertile ones strongly contracted..........................Tribe II. Onocleae
   2. Inducium superior
      3. Fronds simple, entire, lanceolate, articulate to the epigaenous creeping rhizome; sori and inducium reniform, mostly borne near the base of lateral forked free veinlets.......................Tribe III. Oleandreae
      3. Fronds variously lobed or once to many pinnate, not articulate to the rhizome; sori variously distributed, inducium various. Veins simple or forked.
         4. Inducium (when present) oblong, round or reniform, attached by a longitudinal axis, a central point or by a more or less deep sinus, opening all round the edge or nearly so..

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         4. Inducium roundish, oblong or linear, fastened mostly at one side of the sorus, opening at the opposite free edge.
            5. Inducium marginal, consisting of the reflexed or recurved margin or portion of the margin, opening inwardly................Tribe V. Pterideae
            5. Inducium not marginal, but often reaching the margin with one of the free edges.
               6. Sori either roundish and solitary, terminal on the veins or oblong to linear and uniting the apices of 2 or more veins; inducium attached at least on the inner side (base) of the sorus, opening outwardly.Tribe VII. Blechneae
               6. Sori linear or oblong, sometimes much recurved or horse-shoe-shaped, springing from the sides of the veins, rarely placed between the veins; inducium attached on the same side as the sori, mostly opening towards the costa, rarely towards each other, or away from the costa..........Tribe VIII. Asplenieae

1. Sori exinduciate, or sometimes covered by the recurved, not modified margin or portions of the margin, often more or less deeply sunk in marginal or dorsal grooves or pit-like saccate or inducium-like cavities or depressions of the frond.
  2. Sori definite; sporangia gathered into sori, which are often contiguous or confluent, but always distinct when young.
    3. Fronds articulate to the rhizome. Sori punctiform, round, oblong, or linear and then running either parallel to the midrib and the margin, or parallel to the primary lateral veins from the midrib to the edge of the frond or a pinna.......Tribe XI. Polypodieae
    3. Fronds not very indistinctly articulate to the rhizome. Sori linear or linear-oblong. Continuous or interrupted, free or reticulate.
      4. Sori parallel to the costa and margin in 1 costal, medial or marginal line sunk in more or less deep groove on each side of the costa running transversally or obliquely to the veins or veinlets.
        5. Rhizome erect, scales light-brown; sori without paraphyses, sporangia with two stomium-cells.... ....Tribe X. Cochlidiinae
        5. Rhizome creeping, scales dark-brown; sori with paraphyses sporangia with four stomium-cells. ....Tribe XII. Gymnogrammeae
  2. Sori indefinite, the sporangia crowded over the entire under surface of the fertile fronds or segments, which are not rarely becoming narrowly linear.................. ....Tribe XIII. Acrosticheae

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Tribe I. Woodsieae

Sori globose, oblong or linear, situated on the back or apex of a vein or veinlet. Inducium inferior, cupuliform, globose or sausage-shaped, fastened all round the receptacel, open at the top or rupturing down irregularly, sometimes rudimentary. Stipes not articulate or articulate to the rhizome, spores lateral.

Key to Genera

1. Inducium attached on all sides, globular, saucer-shaped, or rudimentary.
  2. Fronds large, 3-pinnate; inducium globular, closed.
    3. Sori sessile.....................11. Diacalpe
    3. Sori long-stalked................12. Peranema
  2. Fronds much smaller, 1-2-pinnate; inducium saucer-shaped or rudimentary....................13. Woodsia
1. Inducium attached on the lateral sides with free apex, cupulate.
  2. Sori dorsal on the veins...........14. Cystopteris
  2. Sori terminal on the lateral veinlets...................... ....15. Acrophorus

11. Diacalpe Blume, Enum. Fl. Javae 241, (1828).

Type: Diacalpe aspidioides Bl.

Sori globose, arising from the back of veins or veinlets; receptacle small, scarcely elevated; involucer inferior, globose hard-membraneous, sessile, at first entire, and covering the whole sorus, at length bursting very irregularly at the top. Sporangia numerous, nearly sessile, with a broad, annulus. Fronds fasciculated, large, herbaceous much decompound; stipes and rachis paleaceo-hirsute, veins pinnate; veinlets simple, free, clevate at the apex with the margin; the lowest anterior veinlet soriferous; sori usually one to each ultimate segment. Stipes not articulated to the rhizome; ~~ty~~ erect.

A genus of 1 species, endemic in tropical Asia.

Diacalpe aspidioides Bl. Enum. 241, (1828); HKBK. 45; Christ 159; NFFL. 159; Matthew 356, (1911).

Physematium aspidioides Kze., 1837.
Cyathea aspidioides Moritt 1845-46.
Diacalpe pseudo-caenopteris Kze., 1846.
Sphaeropteris hookeriana Wall., 1829.

A graceful fern, 2/3-1 1/3 m. high, with rather long stipes, clothed below with very large broad, opaque, brown, membraneous scales; similar scales, but smaller and almost rotundate, are seen at the axiles of the pinnae of the younger plants. Fronds tripinnate, primary pinnae of the younger plants. Fronds tripinnate, primary pinnae often nearly opposite; main and partial rachis frequently beset with copious short setose scales, especially below, sometime with long crinite scales which also appear on the veins above; those afterwards disappear and the rachis then quite glabrous. Pinnules submembraneous, oblong-cuneate, pinnatifido-lobate, more or less decurrent so that the rachis of ultimate pinnae generally winged, the lobes are deeper at the interior edge; veins dark-colored, simple-ponnate the veinlets undivided, not reaching quite to the margin; involucer exactly globose, attached by a small point, dark mahogany-colored.

Java, Philippines, East India and China: Szechwan, Yunnan, Kweichow.

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12. Peranema Don, Prod. Fl. Nepal. 12, (1825).
(Sphaeropteris Wall. non Bernh. 1801).
Type: Peranaema cyatheoides Don.

Sori globose, on the back of veins or veinlets; receptacles elevated, globose, coriaceous, stalked, at first entire and covering the whole sorus, at length bursting rather irregularly and vertically at the top into 2 valves or lips; sporangia numerous

stipitate; fronds erect, stipitate, (stipes and rachis chaffy), tripinnate; veins simply pinnate, veinlets rarely forked, clavate at the apex within the margin, and glandular below the apex on the under side; lower anterior veinlets soriferous; rhizomes large, globose; no distinct caudex. ("peri" around; "nema," a thread, alluding to the sorus on a thread-like stalk.).

A genus of one species, native of Northern India extending to S. W. China.

Differs from its near relative, Diacalpe, chiefly by the inducium being furnished with a long thread-like stalk.

Peranema cyatheoidea Don. Prod. Fl. Nepal. 12. (1825); Christ 286; HPFL. 160.

Sphaeropteris barbata Wall., 1828; HKBK. 49.

Fronds 2/3-1 m. long, tripinnate; the base of the stipes densely clothed with brown membraneous acuminate scales; the main and partial rachis with fewer scattered smaller ones; pinnules oval-oblong, sessile, decurrent, so that the partial rachis is winged, obtuse, glabrous, turning brownish-black on drying; veins indistinct, rarely more than one sorus on each pinnule, stalk of the involucer often longer than the involucre itself; it is upon the presence of this remarkable stalk, the more thick and coriaceous texture of the involucer, opening into 2 valves or lips and the large receptacles, that the genus depends as chief distinguishing characteristics from the genus Diacalpe Bl.

Himalaya, India, China: Szechwan.

13. Woodsia R. Brown, Prod. Fl. N. Holl. 158. (1810); Tr. Linn. Soc. II. 170, (1815).

Type: acrostichum ilvense L.

Sori globular or round; borne on the back of simply forked free veins; inducium soft-membraneous, often evanescent, attached by its base all around the receptacle, inferior (i. e. under the sori), from the first caliciform, or more or less globular, its margin nearly entire or deeply cleft into lacinias which are usually terminating in long hairs involving the sporangia, either small and open, or else enclosing the sori and early bursting at the top into irregular pieces or lobes at the mouth or margin or sometimes rudimentary. Frond narrow or long-lanceolate in outline and small, generally not exceeding one foot in length, more often densely shaggy in all parts turning ferruginous brown later, simply pinnate, bipinnatifid or bipinnate or sometimes tripinnatifid; pinnae numerous veins simple or forked, free, the lower exterior branch sporangiferous on or below its apex. Stipe tufted, short, slender, mostly obscurely jointed at a distance of an inch or more above the rootstock and at this point it separates when the frond dies, leaving the base as a sort

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stubble still attached to the short erect or oblique rootstock. (After Joseph Woods, an English Botanist, 1776-1864).

Species 30, mostly small herbaceous and tufted pinnately divided ferns, from cold and temperate regions of the world, provided with fibrous rootstocks.

A small genus of ferns characterized by their inferior inducium, inclosing the sori at first, but soon splitting into star-like lobes and later hidden beneath the sorus.

Key to species.

1. Inducium rudimentary or smaller ~~and~~ than the sorus, often fringed with laciniae, which extend beyond the sorus (~~Euwoodsia~~). (Euwoodsia).
  2. Frond tripinnatifid or bipinnate, glabrous, texture thin membranaceous.........................1. W. gracillima
  2. Frond bipinnatifid or simply pinnate, more or less scaly at least when young; texture much thicker.
    3. Plant densely ferruginous hairy; frond broad-lanceolate to oblong.
      4. Pinnae pinnatifid.
        5. Pinnae cordate-ovate, pinnatifid into few (few (5-7) obovate entire lobes...2. W. alpina
        5. Pinnae oblong-deltoid, pinnatifid into many oblong obscurely crenate lobes...3. W. ilvensis
      4. Pinnae only dentate or lobato-dentate...4. W. lanosa
    3. Plants subglabrous or entirely glabrous; frond linear-lanceolate to lanceolate.
      4. Pinnae cuneate at the base, toothed on the upper edge.........................5. W. hancockii
      4. Pinnae subcordate or truncate at the base, edge pinnatifid..................6. W. glabella
1. Inducium larger than the sorus, enclosing it at first and irregularly bursting open from the top at maturity. (Physematium)
  2. Pinnae more or less prominently auricled on the upper side at the base.
    3. Pinnae, at least the lower ones, lobato-pinnate or pinnatifid down to the costa.
      4. Pinnae up to 16 pairs, the lower ones subopposite, pinnatifid into 3-5 entire ovate lobes.
        5. Stipes and rachis blackish and fragile.............................7. W. pellaeopsis
        5. Stipes and rachis not so.8. W. sinuata
      4. Pinnae to 50 pairs, opposite, pinnatifid down to the costa into about 15 minutely crenulate segments on each side......9. W. indusiosa

3. Pinnae subentire or slightly crenate
    4. Texture subcoriaceous, inducium ciliate; pinnae prominently auricled on the upper side of the base, margin entire or only obscurely crenulate.. ....10. W. polystichoides
    4. Texture thin, inducium not ciliate, much less prominently auricled on the upper side of the base, margin more or less crenate.............. ....11. W. cinnamomea
2. Pinnae not auricled at the base.
    3. Pinnae only more or less crenate.
        4. lower pinnae much reduced, texture subcoriaceous; sori and veins hidden in a dense matting of ferruginous setaceous hairs.
            5. Frond about 6 cm. long, pinnae oblong.......... ....12. W. rosthornianum
            5. Frond below 4 cm. long, pinnae broad-ovate to almost orbicular........................ ....13. W. cycloloba
        4. Lower pinnae not reduced, texture thin herbaceous, much less hairy, veins and sori visible.......... ....14. W. macrospora
    3. Pinnae deeply pinnatifid.
        4. Inducium non-ciliate...15. W. elongata
        4. Inducium ciliate.
            5. Inducium membranaceous, split into 4 lobes, each provided with very long ciliae along the margin.. ....16. W. macrochlaena
            5. Ciliae much shorter
                6. Frond more or less pale-aceous, texture firm, the lower pinnae reduced
                    7. Frond bipinnate or tripinnatifid, pinnae more than 20 on each side................ ....17. W. xanthosporangia.
                    7. Frond bipinnatifid, pinnae less than 10 on each side....18. W. insularis
                6. Frond glabrous, texture membranaceous, lower pinnae scarcely reduced.
                    7. Pinnae 3 cm. or more long, deeply pinnatifid with free basal segments, which again sharpely serrate-dentate................. ....19. W. veitchii
                    7. Pinnae up to 3 cm. long, pinnatifid 2/3 down only, segments entire or only slightly sinuate at the apex........................ ....20. W. manshuriensis

1. Woodsia gracillima C. Chr. Med. Got. Bot. Tradg. 7. 42, t. XVI. f. a-d, (1924).

Rhizome short, densely radiate, ø clothed in dense, reddish, ovate, acuminate paleae. Stipules fascicled, numerous, about 2 cm. long, slender, stramineous, glabrous, articulated slightly below the middle. Lamina lanceolate, attenuate on both sides, 5-10 cm. long, 1-2 cm. broad, pale green, extremely tenuate,

bipinnate or tri-pinnatifid, rachis greenish-stramineous, glabrous, winged upward. Pinnae remote, The lower ones reduced, the middle largest, shortly petiolulate, deltoid, 1-1.5 cm. long, base 0.5-0.8 cm. broad, unequal, the upper side lengthened, the lower side cuneate, pinnated. Pinnules 3-4 paired with the upper side of the base largest, deeply lobed; lobes 2-3 toothed, apart, oblique-falcate, decurrent, 1-2-lobulate, with lobules obtuse or subacute. Veins green quite distinct. Sori 1-3 to each pinnule, small, indusium hyalineous beneath which soon freely intermixed with flexible hairs of sporangia.

Chihli- Tien-lin-Ssu
On the most graceful ferns, resembling W. glabella, but differing the having characteristic falcate ultimate lobes.

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2. Woodsia alpina (Bolton) Gray, Nat. arr. br. pl. 2. 17. (1821); NPFL. 161; Matthew 371, (1911).

Acrostichum alpinum Bolton, 1790.
Acrostichum hyperboreum Liljebl., 1793.
Polypodium hyperboreum Sw., 1801.
Polypodium arovonicum wither, 1796.
Woodwardia hyperborea R. Br., Tr. Linn. Soc. xi 173 t. 11; Hk. and Bauer, Gen. Fil. t. 119; Hook. Brit. Ferns t. 7; HKBK. 46.
Woodwardia hyperborea R. Br. form, 3. subcordata Milde, Fil. Europ. 163, 1867.

Glabrous, or with the stipe, rachis, and costae beneath slightly hairy, mixed with a few scattered scales; fronds 10-13 cm. long, 1.2-1.7 cm. broad, linear-lanceolate, pinnated, pinnae ovate and cordate-ovate, the lowest 1.2 cm. distant, pinnatifid with few (5-7 broadly obovate, entire rounded lobes; the inferior lobes distant; needle-like hairs plentiful near the sori, few on other portion of the lower surface of the frond.

Arctic regions and high-land in Temperate Zones of Europe, Asia and America; Altai, East Tibet. China: Manchuria; Yunnan.

3. Woodsia ilvensis (L.) R. Br. Prod. 158, (1810); Tr. Lin. Soc. XI. 173 t. (1815); HKBK. 46; Christ 282; NPFL. 161.

Acrostichum ilvensis Linn., 1753.
Polypodium ilvensis Vill, 1789.
Nephrodium rufidulum Michx, 1803.
Woodsia hyperborea B. rufidula Milde, Fil. Europ. 164, 1867.

A tufted, small fern, stipes somewhat 5-9 cm. long, like rachis costules and veins below crinite with copious rufous chaffy scales, straw-brown, shinning. Frond 6-9 cm. long,

about 3 cm. broad, broad lanceolate, slightly hairy above, slightly attenuate, apex pinnatifid, pinnae about 10 pairs, deltoid oblong obtuse, broader at lower side of base, lower ones 1 cm. apart, the upper closer, sessile, deeply pinnatifid into many oblong obscurely crenated lobes; sori large, marginal, 4-6 to a lobe.

Slightly hairy above; stipes, rachis, costules and veins below crinite, with copious, rufous, chaffy scales; fronds broad, lanceolate longer than stipe; pinnae oblong, obtuse, broader at the base, sessile, deeply pinnatifid with many oblong, obscurely crenated lobes. Sori large- 4-6 marginal on the lobes.

Arctic regions and high mountains in the Temperate Zone, Europe, Asia and America, Altai, Japan, China: Manchuria.

4. Woodsia lanosa Hook. Syn. 47, (1866); NWFL. 161; Matthew
392, (1911).

Gmnogramme andersoni Bedd., Ferns Brit. Ind. t. 341; HKBK. 380.
Woodsia andersoni Christ, 1905.

Frond oblong, pinnated; quite shaggy with most copious, soft, long ferruginous hairs, mixed with very narrow, long, chaffy subulate scales; pinnae subcordate, dentate or lobato-dentate, scarcely pinnatifid.

Common in arctic or cold region of Asia, Himalayas, Yunnan, Szechwan.

Like W. alpinla, differs in fronds densely ferruginous, lanate beneath; the stipes are also villose or lanate, but become glabrous with age.

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Var. attenuata C. Chr. Bot. Gaz. 56: 338, (1913); Differs from the type in frond being gradually attenuate towards the base with the small lower pinnae, the stipes scarcely 2 cm. long, fron 5-6 cm. long, 1 cm. broad and in pinnae oblong not ovate.

Shensi, Yunnan.

Perhaps a new species, more closely related to W. rosthorniana than W. lanosa; probably it is specifically distinct from both. The whole fron very densely covered with grayish hairs, those of the rachis and costae beneath intermixed with some very thin, hyaline scales. The rather thick and short rhizome is densely clothed with broad, red scales. --- C. Christensen.

5. Woodsia hancockii Baker ann. Bot. 5. 196, (1871); New Ferns.
16-17; Matthew 392, (1911).

Stipe~~s~~ densely fufted, 2.5-3.7 cm. long; paleae ovate or lanceolate, pale brown. Fronds lanceolate, bipinnatifid, 5-7.5 cm. long, 1.2 cm. broad; rachis slender, stramineous, naked; pinnae deltoid 6 mm. long, cuneate at the base, toothed on the outer edge; lower lobes cuneate; veins few, distinct. Sori 2 to the lower pinnae; indusium small, with a fimbriate edge.

Chihli: Siao-wu-tai Shan; Szechwan, Manchuria.

Habit of dwarf forms of W. polystichoides; sori of W. glabella; but stipes and rachis stramineous, not castaneous---Baker.

This species, being based upon an very obscure plant, is not essentially different from some of W. sinuata, but it is said to be glabrous.

6. Woodsia glabella R. Br. ap. Richards. in Franklin Narr. of a Journ. 754, (1823); NKBK. 47; Christ 282; Matthew 392, (1911)

Quite glabrous, fronds linear, tapering a little below, pinnated, with the pinnae very remote towards the short stipes, all of them deltoid, texture thin and membranaceous, very obtuse, cut into a few (3-7) short rounded or subcuneate nearly entire lobes.

Arctic America, North Europe, and Asia, China: Manchuria.

7. Woodsia pellaeopsis Hand. Mzt. Symb. Sinic. VI. 18, pl. I. f. 6. (1928).

Rhizome erect, prostrate or creeping, 1 x/ly paleaceous, fuscoblack, clothed with densely fasciculated dead stipes; paleae lanceolate, long-acuminate, to 3 mm. long, 0.5 mm. broad at the base, margin sparcely denticulate, ferruginous and often fusco-black in the middle. Frond 3.5-11 cm. long. Stipe four times as short as the frond, about of equal length, inarticulate, terete, fragile dark-brown, with the lower part densely and the upper part sparcely clothed with similar scales as on the rhizome. Lamina lanceolate or ovat-lanceolate, acute or obtuse at the apex, pinnate into 8-11 pairs of pinnae, obscurely green, subsetaceous with hairs as on the tipes, rachis terete, dark-brown beneath and paler above, densely pilose. Pinnae sessile, ovate-oblong, obtuse, deeply inciso-lobated, to 9 mm. long, 4.5 mm. broad, the lowest ones conspicuously smaller than the upper ones, the uppermost 3-4 pairs confluent with the terminal one. Lateral veins very fine, partly furcated. Sori 1 to each lobe, 1-1.5 mm. in diameter, medial or inframedial on the veins. Inducium split down to the base into slightly pilose lacinia. Sporangia subglobose, shortly stipitate, pale in color, annulus ferruginous.

Closely allied to W. cinnamomea Christ, differs by blackish fragile stipes and rachis.

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8. Woodsia sinuata (Hk.) Christ. Bull. Boiss II, 2. 830, (1902); Mak. Bot. Ma. Tokyo 18. 135. (1904); Matthew 392. (1911).

Woodsia polystichoides var. sinuata HK., Garden Ferns. t. 32. f. 3, 1862; HKBK. 48.

Plant about 6-16 cm. in height, caudex short, ascending, thick; stipes tufted, erect, or erect-patent, stramineous to deep-rufous, clothed with scales at the base, but hairy with fibrillose scales throughout and loosely mixed with ovate-lanceolate or subulato-lanceolate very sharply acuminate scales as on the rachis, about 2-5 cm. long; basal scales rufo-isabel-coloured, ovate to ovate-lanceolate very acuminate, laxly lacerate, concave, membraneous, frond lanceolate, longer than the stipe, about 15 cm. long, 2.5 cm. broad, bipinnatifid, membraneous, thinly covered with very sharply acuminate linear-lanceolate to fibrillose scales on veins and veinlets beneath, subglabrous or very sparcely pilose above; pinnae about 8-16 on each side, usually subopposite but often alternate above, spreading-patent, more or less remote, but remoter below, deltoid or deltoid-ovate, the upper ones ovate-oblong to ovate-lanceolate ovate, the upper ones ovate-oblong to ovate-lanceolate and often subfalcate in outline obtuse at the apex, subtruncate or cuneate-truncate, and very shortly petiolate at the base, but sessile in the superior ones, subauriculate in the upper side at base, pinnatifid, but entire or create-lobed in the superior ones, lobes about 3-5 on each side spreading, oval-ovate or elliptica-ovate, rounded at the apex, entire or slightly forked; rachis straight, slender, reddish or stramineous. Sori intramarginal about 3-8 to a lobe, small, rather closely placed, dorsal, near the end of veinlets; indusium pateriform, fragil, irregularly parted or lobed into a few suboval or subovovate thin lobes, not exceeding the sori in length, with long incurved cilias on the margin. Sporangia rounded, pedicels very short.

Differs from W. polystichoides Eat. by broader pinnae, which are more obtuse, lobato-pinnatifid.

Korea, North China: Chihli.

9. Woodsia indusiosa Christ, Not. Syst. I. 44, (1909); Matthew 392, (1911).

Rhizome short, oblique clad in lanceolate-subulate, reddish paleae 5 mm. long and so also at the base of stipes which are 5 cm. long, terete, rigid like rachis, thick as swan's quill rachis and stipes very slender, sparcely covered with brown, lanceolate, sub-shinning flav-stramineous scalelets 2 mm. long. Fronds lanceolate, acuminate, gradually narrowed towards base, 38 cm. long, 5 cm. broad, bipinnate; pinnae patent about 50 on each side, often opposite, pectinato-confert, the middle over 2.5 cm. long, 8 mm. broad, acutish, sessile, with dilated base incised narrow wing and almost down to the costa near the base; segments about 18 on each side imbricato-confert, 3.5 mm. long, 2 mm. broad,

obtuse, minutely crenulate, costa beneath densely puberulous; sori about 5 on each side of costa induсium gray, puberulous, ciliate, 1 mm. broad, scalelike not bullate all velate; texture herbaceous, color flavo-green.

Yunnan.

This is a species of largest size ever known in the genus, remarkably distinct for its small, non-incised pectinate-imbricate pinnules and very large dense velated sori forming a united plate on the grey under surface of the pinnae.

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10. Woodsia polystichoides Eaton, Proc. Amer. Acad. 4. 110, (1858); HKBr. 48 (excl y); Christ 283, NPfl. 161.

Physematium polystichoides Trev., 1875.

Plants densely caespitose; stipes rather short (about 3-6 cm.), sparcely clothed in large broad ovate subulate brown scales; frond up to 30 cm. long, generally shorter, subcoriaceo-membranaceous, opacue, lanceolate, simply pinnate, sparcely subulate-squamulose throughout, gradually attenuated towards the base; rachis testaceous, glossy, pinnae 15-20-jugated under the short pinnatifid apex, alternate or subopposite below, patent, or horizontally patent, rather approximate, the lower ones smaller and much remoter, sessile, 1-1.4 cm. long, about 5 mm. broad at the base, lanceolate-falcate, acute, base cuneato-truncate acutely auricled at the superior base, margin entire or obsoletely crenate, indistinctly costate, veins immersed, simple or forked, free; sori intramarginal in a distinct line on each side of the costa, borne at the apex of the free veinlets, induсium blobose of 4-5 concave, ciliated incurved, imbricate membranaceous scales, inserted beneath the sorus, at first orbicular, enclosing several sporangia.

Japan, Korea, China: Chihli, Manchuria, Mongolia, Yunnan, Hupeh, Szechwan, Chekiang.

11. Woodsia cinnamomea Christ, Bull. Geogr. Bot. Mag. 122, (1906); Matthew 391, (1911).

Rhizomes short, caespitose radicose clothed with soft brown lanceolate-subulate scales 1/3 cm. long; leaves numerous, rachis naked, elastically incurate when dried incurvatis intermixed; stipes 4 cm. long, stramineous-rufous, clothed on both surfaces of the frond with very fine hairs 3 mm. long; lamina lanceolate, 8 cm. long, 1½ cm. broad, pinnate; pinnae crowded, about 18 below the apex, pinnules small oblong-obtuse, base obtuse, hastulate, subsessile, obscurely crenulate, veins about 5-jugated obscurely oblique, simple; sori medial, about 5 on each side, ½ mm. broad, punctiform, ochraceous, induсium subnulled; texture soft herbaceous, color fulvo-green.

Szechwan.

Allied to W. rosthorniana Christ, but differs in small more numerous, pubescent, loger pinnae, and stiff; rachis; with a habit intermediate between W. polystichoide and W. rosthorniana.

Probably a very hairy form of W. sinuata (Hk.) Christ.

12. *Woodsia rosthorniana* Diels in Engl. Jahrb. 29: 187 (1900), C. Chr. Ind. 657 (1906).

Woodsia delavayi Christ, Bull. Soc. Bot. Fr. 52; Mem. I. 45 (1905).

Rhizome thick, short, erect or oblique, clothed in pale-red lanceolate or linear-subulate entire membranaceous scales; stipes densely tufted (5-15 together), 2-5 cm. long or much longer in barren leaves, stramineous, densely clothed near the base in scales similar to those on rhizome, ferruginously pilose in other parts, particularly the under surface frond usually evenly pinnate, slightly reduced towards the base; pinnae sessile or subsessile, horizontally patent, 8-14 on each side, opposite or subopposite, sometimes alternate, 6-8 mm. apart, ovate-oblong, base equal, rounded or somewhate dilated, subtruncate or subcordato-truncate, crenate-serrate or deeply pinnatifid in barren leaves, 8-12 mm. long, 3-5 mm. broad at the base, the barron ones much broader with shortly cuneate base and pinnatifid over half way down into

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3-4 rounded, subentire or slightly crenulate lobes on each side; sori completely hidden in thick tomentum, indusium globose at first, reptured at last into long-ciliate laciniae; sporangia 4-6 to each sorus, dark-brown, very shortly stipitate.

Distribution: Szechwan, Yunnan, Kweichow.

This distinct fern belonging to Physematium was first discovered by Herr von Rosthorn in Nan-chuan, S. E. Szechwan, in 1891, and strongly characterized by dense ferruginously hairy coating in all parts or evenly pinnate narrow frond with entire ovate pinnae.

13. *Woodsia cycloloba* Hand.-Mzt. Symb. Sinic. VI. 19, (1929).

Rhizome slender, creeping, densely paleaceous, covered with dead dense stipes about 1 cm. long, with rather sparce frond; paleae subdeltoid from the base, long lanceolate, gradually ended in glandular articulated hairpoint, to 2 cm. long, 0.5 mm. broad, margin sparcely denticulate, ferruginous. Frond to 4 cm. long. Stipe shorter than or subequal to this frond, dark brown, very fragile, covered on the lower part with the similar paleae as on the rhizome, sparcely paleaceous upward. Lamina ovate or elliptic in outline, simply pinnate,

membranaceous the upper surface more densely clothed in the hairs as on the stipe than on the under surface. Rachis terete, brown beneath, complanate, paler and densely pilose above. Pinnae sessile, 5-8 mm. long and as broad or usually slightly narrower, broad ovate, the lowest ones hardly reduced or rather conspicuously smaller the upper ones, entire or slightly undulato-sinuate, the uppermost ones sometimes sublobulately confluent with the terminal pinna. Veins very fine, usually furcate. Sori uniseriate, intramarginal, suborbicular, to 1 mm. in diameter. Indusium none. Sporangia scarcely compressed, shortly stipitate, annulus prominent. Spores about 60 in diameter.

Northwestern Yunnan.

A canty, dwarfed fern, closely allies to *W. macrospora* C. Chr. particularly in the large size of the spores.

14. *Woodsia macrospora* C. Chr. and Max. Journ. Wash. Acad. Sci. 17, 19. 499, (1927).

Rhizome suberect, stout, 2-3 cm. long, 1-1.5 cm. thick, becoming multicipital, densely clothed with thin, yellowish brown, lanceolate-subulate scales. Fronds numerous, laxly ascending, 8-15 cm. long; the stipes 2-8 cm. long, slender, dull yellowish, scantily clothed with lax linear-subulate scales, these smaller upward extending throughout the rachis, intermixed with long and short separate hairs; blades lanceo-oblong, slightly or not reduced at base, obtuse at apex 6-9 cm. long, 2-2.5 cm. broad, pinnate, terminating abruptly in a subconform pinna, thin herbaceous, delicately flaccid-hairy throughout with short hairs intermixed; pinnae 6-8 pairs below the terminal one, subequal~~ly~~ 10-15 mm. long, 5-8 mm. broad, nearly horizontal, alternate to subopposite, sessile, ovate-oblong, subequally truncate-cordate at base, broadly rounded at apex, crenate; veins evident, once or twice forked; sori large, uniserial, medial, sporangia with a few flaccid hairs intermixed, large, globose, with a thick annulus, the spores very large, 60μ in diameter, nearly black, globose, in lateral view coarsely verrucose the exosporium furnished with reticulate crests.

Jargannar, S. W. Kansu.

This plant was collected by the author on the 1923 U. S. National Geographical Society Central China Expedition on the Thibetan border in S. W. Kansu. Unlike all other members of the genus, except *W. rosthornii* Diels with which it somewhat resembles in general habit, which however is much more hairy and the blade narrowed gradually downward, the apex pinnatifid. Remarkable for its imparipinnate frond, large sporangia and large black spores.

15. *Woodsia elongata* Hook. Sp. 1. 62 t. 21 C. (1844), HKBK. 47; Bedd. Ferns Brit. Ind. t. 14; NPFL. 161; Matthew 392, (1911).

Physematium elongatum Trevis, 1875.

Glanduloso-pilose, especially above; fronds a span to 30 cm. long, 2.5-3.5 cm. broad, narrowly oblong, pinnated; pinnae rather distant alternate, sessile from a broadish base, oblong, obtuse, pinnatifid not more than halfway down; lobes short, rounded, inciso-dentate, each beating a globose elevated sorus (rarely more) on the lower anterior veinlet, near the sinus, induclum lax, very membraneous, but persistent, larger than sorus, globose in over-ripe fronds, soon bursting with irregular opening at the apex, margin not ciliate.

N. W. India, Korea, China: Yunnan, Kansu.

16. Woodsia macrochlaena Mett.; Kuhn, Job. 270; (1868); Linn. 36. 126, (1869). Matthew 392, (1911).

Differs from all other allied species of the genus by membraneous inducium being quadrifid, the lobes persistent; furnished with most long cilias along the margin, the lowest segments free the upper adnate.

Shantung: Chefoo.

17. Woodsia xanthosporangia Ching, Bull. Fan. Inst. Biol. 1: 101 (1929).

Rhizome thick, short, erect, densely clothed in the remmamt of dead brown paleaceous stipes of the previous year's growth; paleae dense, ochraceous-brown, thin membranaceous, distinctly clathrate, broadly ovate-oblong to oblong-lanceolate, broadest near the base, which in deeply cordate, gradually acuminate towards the apex and ended in a long-subulate hairpoint, margin shortly and rather sparsely ciliate from some distance above the base. Stipes densely tufted, 4-6 together, 4-5 cm. long, broadly dorso-ventrally compressed, green and green and rather slender and so is the rachis, articulate at 1.5-3 cm. above the base, clad throught with dense paleae similar to the rhizomatic ones but slightly lighter in color. Frond oblanceolate, gradually attenuate towards the base, apex acute, bipinnate or tripinnatifid, 9-12 cm. long, 2-3 cm. broad in the broadest part in the upper one-third; rachis flattened, distinctly channelled and subglabrous above, densely paleaceous beneath, paleae subadpressed, hyaline, similar to, but much smaller tha, the rhizomatic ones. Pinnae 23-27 on each side of the rachis, very shortly petiolate or subsessile, alternate, the lowest ones more or less deflexed, the middle ones horizontal-spreading, almost forming 90 degrees of angle to the rachis, the uppermost ones obliquely adcending, contiguous or subremote, the lowest ones about 5 mm. or more apart, gradually reduced downward, with the basal pair reduced to 2-4 mm. long and broad, the upper largest ones 1-1.8 cm. long, 6-9 mm. broad at the base, deltoid-oblong or nearly oblong (the lowest ones short-deltoid), broadest and truncate at the base, obtuse at the apex, pinnatifid

down to the midrib into 6-8, rarely more, very close erect-spreading pinnules under the short bluntly trifid apex, glabrous on both surfaces except a few sparce scales on the midrib beneath, midrib slightly grooved above, obscurely hidden below, very narrowly winged. Pinnules oblique-oblong, the basal ones in the upper pinnae 3-3.5 mm. long, with the lower side contiguous and aparallel to the rachis, base adnate, margin incised almost half way down into 3-4 close, ovate acute or blunt entire teeth on each side; costule and lateral veins hidden, the latter pinnate in the pinnules, quite visible when held against light, 2-4 on each side, simple, free, erect-spreading, one to each tooth and extending as far as the tip at about 45 degrees of angle to the costule, Texture subcoriaceous, light green above, paler below. Sori bright orange-yellow when young, turning ochraceous-brown at last, usually 1-2 to each pinnule and confined to the lower exterior veins, near the base of the pinnule and close upon the costule, or sometimes 3-6 to each lower pinnule and then the lower interior veins also soriferous, small and medial on the veins, distinct not confluent upon maturity; indusia globular, membranaceous, whitish at first, finally turning ochraceous-brown and irregularly ap~~o~~lit about one-third way down into spread blunt or rounded lanceolate or short-deltoid laciniae with entire or bluntly forked margin. Sporangia without hairs at the base, but provided with a mass of bright orange-yellow, highly viscous, deciduous glands, shortly stipitate, annulus dark yellow, thick, broad, spores globular, dark brown, prominently verrucose. (P. 58).

Chihli - Eastern Tomb.

One of the most graceful and distinct member of the genus. Unlike its all other relatives, our species is characterized by its decided-oblanceolate bi-pinnate or tri-pinnatifid frond, strongly reduced towards the base, bright orange-yellow young sori and numerous closely placed pinnae and pinnules, thickly strewn particularly on the under surface with detatched transparent bright orange-yellow beadlike minute glands, which upon the first glance may be mistaken for the spores. Its systematic position is uncertain. In general habit, our novelty is somewhat comparable with the larger forms of W. insularis Hance or some small forms of Polystichum prescottianum (Wall.) Moore var. shensiense (Christ) C. Chr., from the former it differs by subglabrous bi-pinnate frond, numerous closer pinnae and bright colored young sori.

13. Woodsia insularis Hance, Ann. Sci. Nat. IV. 15. 228, (1861); Hk.BK. 47; NPFL. 161.

Rhizome short; scale 4-6 mm. long, oblong-lanceolate, reddish; stipes 2.5-3.7 cm. long, articulated near apex; fronds oblong lanceolate, 3.7-7.5 cm. long, bipinnatifid; pinnae 6-8-jugate, bluntly lobed, lower reduced; texture form; both sides pubescent; sori submarginal, 1-4 to a lobe; inducium large, membraneous, persistant, with ciliated lobes.

E Siberia, N. China: Chihli, Shantung, Manchuria.

Intermediate between W. ilvensis or W. manchuriensis

19. Woodsia veitchii Christ, Bull. Geogr. Bot. Man. 121, (1906); Matthew 392, (1911).

Rhizomes thick, hard, clothed with ovate-acuminate large dark brown scales ½ cm. long; leaves fasciculated, stipes slender 10 cm. long, straminesus-brown, with the base clothed in the similar scales, the upper part sparcely covered with narrow subulate flaccid patent brown scales, costa sparcely with ovate minute scalelets; glabrous in

(P. 59).

other parts of the lamina; fronds ovate, acuminate, scarcely narrowed towards the base, 20 cm. long, 7 cm. broad, bipinnatifid, pinnae remote the lower ones separately with an interspace 2 cm. broad, sessile, broader at the base, oblong, obtuse, about 18 on each side, below the pinnatifid apex, 3½ cm. long, with base 12 mm. broad, deeply pinnatifid, with base pinnate, i. e. segments free; segments ½ cm. long and broad, broadly ovate, very obtuse, about 8 on each side, broadly adnate, close, the upper ones contiguous, acutely dentate-serrate, costa and veins conspicuously black the latter pinnate in lobes, forked from base; sori medial about 6 to a lobe, large, rounded, almost 1 mm. broad, ochraceous; indusium narrow, plane, peltate, ciliate, pale, evanescent; texture herbaceous, color pale green.

West China: Szechwan.

20. Woodsia manchuriensis Hooker, 2 Cent. t. 98, (1861); HKBK. 48; Christ 283; NPFL. 161.

Diacale manchuriensis Trev., 1875.

Frond 15-20 cm. long, thin, membranaceous, oblong-lanceolate, glabrous, acuminate, pinnate; pinnae sessile, 2.5 cm. or more long, rather remote, oblong-obtuse, pinnatifid; lobes oblique, patent, ovate, obtuse, entire or slightly sinuate, unisorous; veins pinnated in each lobe, lower superior veins soriferous; sori large, near the costa, inducium globose, thin, membranaceous, at length opening with a toothed edge to the contracted mouth.

Japan, Korea, China: Manchuria, Chefoo, Chihli, Honan, West China.

14. Cystopteris Bernhardi, Schrad. Neu. Journ. 12 5, 26. (1806).

Type: Polypodium fragile L.

Sori globose, on the basck of a straight, forked free veins; inducium membraneous, suborbicular, hoodlike or arch/ed, attached by a broad base on the sinner side (toward the midrib), partly inserted under the sorus, covering the sorus at the beginning like a hook, but soon opening free at the other side and thrown back or withering away. Fronds small, 2-3 pinnate, the pinnules lobato-inclsed, of thin texture; veins free, (Greek, a "bladder" and "fern" from the inflated inducium).

About 13 species, of all delicate small ferns, in habit allies to Woodsia and Microlepia, and remarkable among ferns in having its geographical head-quarters in the Temperate Zon of both hemispheres; and differs from its near allies by its dorsal sori provided with a hood-shaped inducium attached to the frond by a broad base on the inferior side of the sorus and arching over it; 6 species are known from China.

Filix is the oldest name for the genus, but since the name Cystopteris has been universally accepted among botanists for so long a time that it is very unlikely that Filix will ever be used in place of the present one.

(P. 60).

Key to species.

1. Pinnae with petioles 2-3 cm. long.........1. C. grandis

1. Pinnae much shorter or subsessile

  2. Basal pinnae shorter than the upper ones..2. C. fragilis

  2. Basal pinnae longer than the upper ones.

    3. Fronds bipinnate, stipes to 12 cm. long...3. C. kansuana

    3. Fronds tripinnate, stipes longer....

      4. Fronds oval, owing to the strongly ascending basal pinnae..........................4. C. mairei

      4. Fronds deltoid.

        5. Stipes shining, dark ebeneous; pinnae sessile, truncate, pinnae and pinnules closely pectinnate. ....5. C. japonica

        5. Stipes pale stramineous; pinnae petiolate, cuneate, pinnae and pinnules more far apart.

6. Rhizomes erect...........6. *C. setosa*
6. Rhizomes wide-creeping
7. Sori small, 18-24 to the lowest segment.................7. *C. montana*
7. Sori large, 2-6 to the lowest segment..
8. Sori glabrous.....8. *C. moupinensis*
8. Sori glandulose hairy...............
.................9. *C. sudetica*

1. *Cystopteris grandis* C. Chr. in Lev. Cat. Plant. Yunnan 100, (1916).

Rhizome not seen. Stipes incomplete, slender, stramineous, glabrous. Limina ovate, 45 cm. long, 35 cm. broad, quadripinnatifid, flaccid, thin herbaceous, very glabrous, inconspicuously glandular beneath and sparsely provided towards the rachis and costa with minute rufous scales. Rachis and rachillets stramineous, slender, subflexuose. Pinnae about 8-jugated, alternate, the lower ones 12 cm. far apart, petiolate (petiole 2-3 cm. long), deltoid-oblong, shortly acuminate, the inferior ones not reduced nor broadened on both sides at the base, to 20 cm. long, 8 cm. broad. Pinnules alternate, erecto-patent, 8-10-jugated to 3 cm. remote from each other, deltoid, petiolate, 4-5 cm. long, 2.5 cm. broad at the base, the basiscopic ones in the lower pinnae slightly longer, the tertiary pinnules free, pinnatifid below the apex of the secondary pinnules, 5-jugated, the lower ones shortly petiolulate the upper ones gradually confluent, the posterior base cuneato-truncate, the anterior truncate, unequally ovate, apex obtuse, dentate, margin deeply lobed. Ultimate lobes oblong, obtuse, apex dentate, teeth 4-5 to each lobe. Veins pinnate in the lobes 3-jugated. Sori biseriate on the tertiary pinnules, medial, borne on the basal anterior veinlets small; induceum very small, hyaline, soon evanescent.

Yunnan.

A very peculiar species and distinct from all other members of the genus in habit and pinnatifidation of the fronds, it much resembles Athyrium or Dryopteris, but induceum is cystopteroid.
(T. 61).

2. *Cystopteris fragilis* (L.) Bernth. Schrad. Neu. Journ. 1^2. 26 t. 9 (1806); HBK. 105; Christ 280.

Polypodium fragile L., 1753.
Cyathea fragilis Sm., 1793.
Aspidium fragilis Sw., 1801.
Athyrium fragilis Spr., 1804.
Cyclophorus fragilis Gray., 1821.
Cystopteris viridulum Desv., 1827.

Stipes 5-10 cm. long; fronds 10-20 cm. long, 3.7-5 cm.

broad, ovate-lanceolate, tripinnatifid, main rachis slightly winged above; largest pinnae 2.5-3.7 cm. long, 1.2-1.9 cm. broad, lanceolate-deltoid; pinnules oblong-rhomboidal, cut down to a broad central space into bluntly or sharply-toothed lobes; texture herbaceous; indusium acuminate or acute at the free apex, sori 2-13 to a pinnules.

A cosmopolitan species, Europe South Africa, America, to India, Pacific Islands, China: Shensi, Kansu, Chihli, Manchuria, Szechwan, Yunnan.

A fairly common fern in N. W. China.

3. *Cystopteris kansuana* C. Chr. Journ. Wash. Acad. Sci. Vol. 17. 19. 499, (1927).

Rhizome short-creeping, slender, 2-4 cm. long, about 1 mm. thick, flexuous, branched very scantily, paleaceous. Fronds several, 2-5 mm. apart, laxly ascending, 8-12 cm. long; the stipes capillary, castaneous, nearly or quite as long as the blades, with a few thin scales at base, glabrous; blades lanceolate, long-acuminate to a subcaudate apex, 4-8 cm. long, 1.3-2 cm. broad below the middle, bipinnate, thin herbaceous, glabrous; pinnae in 6- or 7 well-developed pairs below the pinnatifid apex, the lower ones 1-1.5 cm. apart, short-petiolulate, subopposite, 1 cm. long or less, deltoid, unequilateral at base, the costa winged; pinnules 1-3 pairs below the pinnatifid apex, the distal basal one much the largest, toothed, winged; pinnules 1-3 pairs below the pinnatifid apex, the distal basal one much the largest, toothed, wing the teeth cleft; veins raised beneath, pinnate in the larger segments, forked in the smaller ones, running out to the extreme sinus of the emarginations these usually bordered by 2 unequal teeth; sori medial or inframedial, indusium ovate, entire, brown, persistent, spores immature.

Kansu - S. Sining

Differs from C. fragilis in its distinctly unequal-sided pinnae and raised veins, and especially by the termination of the veins invariably in the actual sinus of emargination; C. mairei Braus from Yunnan, differs from the present species in being a much larger plant with stipes more than 20 cm. long and tripinnatifid blades.

4. *Cystopteris mairei* Brause, Hedwigia, 54, 200, t. 4, f. (1914).

Rhizomes, stipes 20 cm. long, 0.8-1 mm. thick; stipes like rachis dark stramineous canalled above, rounded beneath, glabrous throughout. Lamina herbaceous, glabrescent on both sides, oval in outline, 12-14 cm. long, 6-8 cm. broad, subtripinnate-pinnatifid; primary pinnae 12 pairs, subalternate, petiolate, patent, deltoid, the upper ones approximate, and remoter as they go towards the base of the lamina, the basals ones 3.5 cm. far apart, unequilateral, those on the under side of the costa

much large, 7.5 cm. long, about 4 cm. broad; at base the secondary pinnae petiolate, remote, oblique, the larger ones pinnato pinnatifid, the smaller ones pinnatifid about
(P. 62).
10-pairs in the lowest primary pinnae and the posterior ones almost twice as large as the anterior ones; segments oval, incised or crenate, apex obtusish slightly denticulate; costa very narrowly winged, veins pinnate, prominent, extending to the sinuses of the teeth. Sori large, dorsal and not apical on the veins, uniserial, on both sides of the lateral veinlets; veinlets approximate, 1-3-paired. Indusium not seen.

Yunnan.

Allied to Cystopteris sudetica, but differs in habit, for its primary pinnae much more ascending and therefore the general outline of the frond appears smaller and oval, and the basal pinnules on the lower side of the costa much the largest and the upper ones gradually diminshing upwards.

5. Cystopteris japonica Luerss. Engl. Jahrb. 4: 363 (1885).

Rhizome wide-creeping, thick as a raven's foot, densely fibrous-rooted, moderately clothed in large brown membranaceous ovate-lanceolate scales; stipes far apart 15-20 cm. long about 2 mm. thick sparcely scaly, dark shinning ebeneous, and so is the rachis. Frond broad deltoid-ovate, 25-30 cm. long, 15-22 cm. broad at the base, tripinnatifid or tripinnate below; pinnae about 15 on each side under pinnatifid acuminate apex, sessile truncate opposite, rarely subopposite, 5-3 cm. apart erect-patent, forming an angle of 70 degrees to the main rachis, the lower ones much the largest, 15 cm. long, 5-6 cm. broad in the broadest part, which is about 1/3 way up from the base, the upper ones gradually shortened, pinnate lanceolate but the lower 2 pairs elliptical lanceolate by the shortening of basal pinnules, secondary rachis light chestnut; pinnae of second order about 15 on each side, 3 cm. long, 1.2 cm. broad and oblong-lanceolate in the broad part of lower primary pinnae, those in the pinnae next above 2 cm. long, 1 cm. broad long-oblong, those in the middle pinnae 1 cm. long, ½ cm. broad, oblong, all sessile, broadest and truncate at base; pinnate in lower pinnae, but pinnatifid to ~~simple~~ broad-winged costae in the upper pinnae, pinnules oblong, rounded inciso-crenate, segments (or pinnules) in the upper pinnae oblong, with rounded or truncate denticulate apex, veins fine, pinnate in pinnules or segments, forked in the segments of upper pinnae; sori small, rounded, dorsal or subapical on the anterior basal veinlets near the sinus, 1 to each segment or teeth, indusium membranaceous, soon evanescent; texture thin herbaceous, color light green.

Japan, China: Fukien.

A unique species of the genus for largest size, dark shinning ebeneous stipes and rachis, opposite sessile pinnae. In general outline, it resembles C. montana, but differs in other respects.

Specimen from Fukien (Yanping gorge) has dimension half as large as the Japanese type and tripinnatifid with dense scaly stipes, otherwise an identical with type.

(P. 63).

6. Cystopteris setosa Bedd. Ferns Br. Ind. t. 312, (1867); Christ 281; Matthew 355, (1911).

Lastrea setosa Bedd., 1868.
Davallia setosa Baker, 1874 HKBK. 368.

Caudex erect; stipes 15-20 cm. long, grey-stramineous, with a few linear scales; fronds deltoid, 3-60 cm. long, 4-pinnatifid; pinnae patent, subdistant, lanceolate, lowest largest, 15-23 cm. long, 3.7-7.5 cm. broad; pinnules subsessile, patent, close, lanceolate, segments close, sessile, oblong, blunt, lowest deeply pinnatifid; texture membranaceous; both sides green, with scattered subulate scales; veining regularly pinnate; sori one to each final lower lobe indusium minute, oblong, membranous, fugacious.

India, Birma, China: Kweichow.

7. Cystopteris montana (Lam.) Bernh; Desv. Prod. 284, 1227; HKBK. 104; Christ 281; NFPL. 164.

Polypodium montana Lam., Fl. Franc. 1. 23, 1778.
Cyathea montana Sm., 1793.
Aspidium montana Sw., 1801.
Filix montana Underw., 1900.

Rhizomes wide-creeping; stipes slender, erect, 15-23 cm. long; frond about 15 cm. each way, deltoid, quadripinnatifid; lowest pinnules deltoid-lanceolate, 2.5-3.5 cm. long, 1.2-1.9 cm. broad- segments cut down to the rachis below, the lobes oblong, 4 mm. long, 2 mm. broad, deeply and sharply toothed; texture thinly herbaceous; sori small, 18-24 to the lowest segments.

In mountains in Scandinavia, Scotland, and central Europe, Rocky Mountains in N. America, West Canada, China: Szechwan, Chihli - Sia-wu-tai Shan. new species to China, also a first record from Central Asia.

8. Cystopteris moupinensis Franch. in Nouv. Arch. Mus. 2. 10; 111 (1887); C. Chr. Ind. Suppl. 46 (1905-1917); Hand-Mzt. in Synb. Sinic. VI; 20 (1929).

Cystopteris sudetica A. Br. et Milde, Bedd., Handb. Suppl. 16 (1892);
Davalia triangularis Baker, Ann. Bot. 5; 202 (1891).

Rhizome slender, wiry, wide-creeping, subglabrous; stipes slender, elongated, far apart, 10-15 cm. long, greenish, glabrous; frond deltoid-ovate, subtripinnate, 10-17 cm. long, 6-10 cm broad at the base, attenuate to the fine acuminate or caudate apex; pinnae all petiolate, erect patent, 2-3 cm. apart, alternate, the basal ones lanceolate, 4-7 cm. long, 1.5-2.2 cm. broad, acuminate, cuneat at the base; pinnules subrhombic-ovate or ovate-oblong, about 6-11 on each side, the upper inner base straight, the lower cut away to the costa, the lowerones pinnate or deeply pinnatifid towards the base; lobes ovate, with rounded inciso-dentate apex; texture thin herbaceous; sori mostly 6-8, sometimes only 3 to each pinnule, dorsal on the veinlets; inducium glabrous, thin membranaceous, at last evanest

Distribution; Szechwan, Yunnan, Tibet.

An fairly uniform and distinct endemic species, closely related to C. sudetica by glabrous inducium, differs by smaller frond and cutting. First discovered by Pere David in Tibet, later by Delavay in Yunnan and again by Wilson in W. Szechwan. Our figure is drawn from Wilson's No. 5311.

(F. 64).
9. Cystopteris sudetica A. Br. et Milde, 35 Jahresber. Schles. Ges. 92, (1855); ICBM. 103; Christ 281, NPFL. 164.

Cystopteris leucosoria Schur., 1858.

Rhizome wide-creeping; stipes slender, 15-23 cm. long; frond 15-23 cm. long each way, deltoid, tri- or quadripinnatifid; lower pinnules deltoid-lanceolate, 2.5-3.7 cm. long, less than 1.2 cm. broad; lower segments 6 mm. long, 4 mm. broad, ovate-rhomboidal, deeply toothed; texture herbaceous; sori much larger than in Cystopteris montana only 2 to 6 to the lower segments.

Europe, E. Siberia, China: Tibet, Manchuria, Szechwan, Yunnan, Shensi.

15. Acrophorus Presl., Tent. Pterid. 93, (1836).

Type: Aspidium nodosum Bl.

Sori roundish, submarginal, terminal on a veinlet, which is springing more or less from the middle of the fertile, inducium broadly ovate, attached at the inner side of the sorus, free at the sides, opening out-wardly. Fronds much divided; veins free; rhizome erect; stipes tufted, not articulate to the rhizome.

A monotypic genus of a native of Indo-malayan region, recently recorded from South China.

Acrophorus stipellatus (Wall.) Moore, Gard. Chron. 135, (1854);
Hayata in Bot. Mag. Tokyo. XXIII. 4 (1909); Matthew
339 (1911).

Davallia stipellata Wall., 1838.
Davallia nodosa HK., HKBM. 92.
Acrophorus nodosa Presl., 1836, Christ 285; HPFL. 164.
Leucostegia nodosa Bedd., 1876.
Aspidium nodosum B., 1828.

Fronds tripinnate membraneous, furfuraceous on both sides of the veins, pinnules sessile, chaffy beneath at their insertions, oblong-lanceolate, secondary ones sessile, oblong obtuse, pinnatifid; lowest ones inciso-serrate or at the base again subauriculate; sori solitary, sub-marginal; rachis nodose above at the insertion of the pinnae and ferrugineous-tomentose; stipes not articulate, slightly rough or glabrous, paleaceous below; rhizomes short-creeping.

Formosa, Himalayas, Khasia, Malacca, China: Canton - Lo-Fou Shan, (merrill, 1916), new to China.

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Tribe II. Onocleae

Like the tribe I in sori and indusia, but fronds dimorphous, the fertile ones much contracted, 1-2 pinnate; veins free or anastomosing.

Key to Genera of Onocleae and Oleandreae

1. Fronds dimorphous, 1-2-pinnate (Onocleae), not articulate
   to the rhizome.
  2. Fronds tufted; the fertile ones onceapinnate; veins free..
     ....16. Matteuccia
  2. Fronds scattered; the fertile ones 2-pinnate; veins
     anastomosing copiously............17. Onoclea
1. Fronds uniform, simple, entire, articulate to the rhizome
   (Oleandreae)........................18. Oleandra

16. Matteuccia Todaro, Syn. Pl. Acot. vasc. Sicilia
30, (1866).

Type: Osmunda struthiopteris L.

Sori round, confluent on the veins; indusium extrorse; hemispherical, quite ephemeral; spores bilateral; receptacle medial, the base of the pedicel of the sporangia concret, forming thickened receptacles; fronds fascicled, erect, dimorphous, pinnate or bipinnate, rarely tripinnatifid; the sterile ones once-pinnate, the pinnae deeply lobed or pinnatifid, the fertile much shorter than the sterile, once-pinnat of stouter texture, dark-colored, the pinae much smaller, shallowly lobed; veins pinnate, veinlets free, contracted, linear, with membraneous revolute, conniving margins, forming an universal indusium

rhizomes thick, short, erect, tufted.

Sp. 4 in Northeastern Asia, all known from China.

In general habit, this genus resembles Onoclea, but differs by upright rhizome, sterile fronds arranged in a crown, free, pinnate veins and veinlets, the once-pinnate fertile frond springing from the centre of the crown and the fugacious indusia.

Key to species

I. Sterile frond tripinnatifid..........1. M. cavaleriana
II. Sterile frond bipinnatifid.
   A. Pinnae scarcely shortened downward, long /// linear, cut into short oblong truncate imbricate segments...
      ....2. M. orientalis
   B. Pinnae markedly shortened, downward long-oblanceolate, cut broader, longer (in the upper 1/3 broad part broader obtuse segments.
      1. Sterile frond long-stipitate, rachis chaffy.......
         ....3. M. intermedia
      2. Sterile frond shortly stipitate, rachis smooth....
         ....4. M. struthiopteris

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1. Matteuccia cavaleriana (Christ). C. Chr. Ind. 420, (1905); 372, (1911).

Struthiopteris cavaleriana Christ., Bull. Acad. Geogr. Bot. Man. (1904), 110, c. fig.

Stipes of sterile fronds over 10 cm. long, and like pale stramineous rachis sparcely covered with subulate thin ochroleucous scales; fronds acuminate, broadly deltoid, 25 cm. long, 18 cm. broad, tripinnatifid, pinnae ovate-triangular, acuminate, very shortly petiolate, about 15 on each side under the lobed apex, lower ones falcate, the lowest much the longest, 10 cm. long, 8 cm. broad, base broadened downward, pinnate, the upper ones nearly lobed; pinnules on the posterior side at the base of lower pinnae the largest, 4½ cm. long, 2 cm. broad, petiolulate, obtusish, broadly lanceolate, deeply cut nearly down to the rachis in the lower ones, lobes obtuse, crenulate; upper pinnules and apical pinnae shortly denticulate; veins in lobes of pinnules impressed, punctate at apice, color pale green, opaque, texture herbaceous. Stipes of fertile frond very long, 51 cm. long, strong; thick as a goose's quill, woody, lucid, brownish-red; fronds 30 cm. long, pinnae about 15 on each side, close, erecto-patent, closely convinens, 12 cm. long, the lower ones slightly shorter, 5 cm. broad, linear, obtusish, obsolete, margin subcrenate, scariose; texture hard coriaceous, color atratous-castaneous, nitent.

China: Kweichow.

2. *Matteuccia orientalis* (Hooker) Trev. Atti. Ist. Veneto. III. 14. 533. (1869); Matthew 372, (1911).

Struthiopteris orientalis Hooker, 2 Cent. t. 4. 1860; Christ 285; NPFL. 166.
Onoclea orientalis Hooker, 1862, HKBK. 46.
Matteuccia orientalis Trev. var. brevis Christ, Bull. soc. Fr. 52. Mem. 44. 1905.
Matteuccia orientalis Trev. var. incisa Christ, 1905.

Fronds ovato-oblong, not attenuate at the base; fertile ones oblong, (often 60 cm. long) contracted; pinnae linear-oblong, flatted, 2-edge, the broad refracted margin covering the whole back, dark purplish brown, glossy, at elongate, spreading, torn at the margin. Indusium not seen present so far.

Sikkim, India, Assam, Japan, Corea, China: Yunnan, Kiangsi, Shensi, Kansu, Szechwan, Kweichow, Chekiang, Anhwei.

3. *Matteuccia intermedia* C. Chr. Bot. Gaz. 56. No. 4, (1913).

Onoclea germanica Willd. var. stenophylla Franch., Pl. David. 149.

A critical form intermediate between *M. struthiopteris* and M. orientalis, with the former it is similar in the size of the habit, but differs in the basal scales being black, the rachis chaffy the frond long stipitate, and gradually narrowed towards the base, the lobes of pinnae not deeply pinnatifid, the tertiary veins about 5-jugated, the fertile pinnae 6-7 cm. long, 3-4 mm. broad, recurved; from the latter it is similar in venation, color and the paleae of the rachis, but differs in pinnae being narrower, the lower 2-3 pairs abbreviated.
Sikkim, China: Szechwan, Shensi: Tai-Pei-shan.

(P. 67).
A most critical form intermediate between *M. struthiopteris* Torado and M. orientalis (Hooker) Trev. The fertile leaf resembles M. struthiopteris is size and in breadth of the pinnae; it differs in (1) the long stipe, which is up to 20 cm. long 0.5 cm. or more thick, broadly furrowed above, in the lower part and especially at base clothed with large (2 cm. long by 0.5 cm. wide) nearly black, glossy entire scales; (2) the lamina being very shortly attenuate downwards, the lower two pairs of pinnae only being somewhat abbreviated; (3) the rachises, like the costae of the pinnae beneath, clothed with several minute black scales; (4) the incised not more than a third of the way down to the midrib into broad obtuse lobes; basal lobes scarcely prolonged, but the lower one considerably broader and imbricating the upper side of the rachis, under surface pale, glandular with scattered yellowish glands; and (5) the venation, the tertiary veins being very oblique, about 5 to a side, the lower ones curved upward and running to the

sinuses. M. orientalis has much broader and more deeply cut pinnae, the basal ones not at all abbreviated. Fertile leaf has stipes and rachis beneath rather scaly with light-brown, crisped scales; stipes 30 cm. long, lamina 40-50 cm. long, about 10 cm. broad; lower pinnae a little shortened, middle ones 5-7 cm. long, 3-4 mm. broad, at first erect, later recurved from the erect base with tips downward; costae scaly beneath, the veins distinctly seen on the upper side. Indusium apparently wanting.

Nearest to M. orientalis. It is possibly identical with Struthiopteris orientalis var. brevis Christ, Bull. Soc. Bot. France, mem. 1: 44, from Szechwan and Hupeh.

4. Matteuccia struthiopteris (L.) Torad., Syn. Pl. Acot. Vasc. Sicilia. 30, (1866); Matthew 372, (1911).

Osmunda struthiopteris L., 1753.
Struthiopteris germanica Willd., 1809; Christ 285; RPL. 104.
Onoclea struthiopteris Hoffm., 1795, LKB. 36.
Pterinodes struthiopteris O. Ktze., 1891.

Fronds growing in a crown; sterile ones shortly stalked, 30-60 cm. high, broadly-lanceolate, or oblanceolate, narrowed toward the base, with many linear-lanceolate pinnatifid pinnae; veins free, the veinlets simple;fertile fronds shorter, stiff, simple pinnate with pod-like or somewhat necklace-shaped pinnae, which are much contracted, linear-terete, torulose, lobed and torn at the margin; indusiumcup-shaped, at the base of each sorus, very fragile and soon obsolete. Thick erect rootstock sends out slender underground stolons which bear fronds the next year.

N. Europe, Austria, N. America Canada to Pennsylvania, Manchuria to Altai, China: Hupeh, Shensi, Chihli.

17. Onoclea Linne. Spec. Plant. 2. 1062, (1753).

Type: Onoclea sensibilis L.

Sori dorsal, globose, on the veins of the modified and contracted pinnae of the fertile frond and quite concealed by their revolute margins; indusium very thin, delicate membranaceous, hemispherical or half cup-shaped, originates from the interior side of the sorus, or wanting; stipes erect or creeping. Frond stipitate, dimorphous, scattered; fertile fronds erect, bipinnate pinnules recurvato-globose
(P. 68).
with contracted pod-like or berry-like divisions, at first completely concealing the sporangia, and at last when ripe indurated, cracking open at the summit and allowing the spores to escape; veins of sterile fronds copiously anastomosing. (Greek. "close" and vessel," alluding to the close-rolled sporophylls).

A monotypic genus inhabiting the northern temperate and cold temperate regions of both hemispheres.

Onoclea differs from Matteuccia chiefly by running rootstock, scattered fronds, bipinnate fertile fronds, and anastomosing veins.

Onoclea sensibilis Linn. Sp. 2. 1062, (1753); HKBK. 46; Christ 284; PNFL. 166; Matthew 374. (1911).

Calypterium sensibile Bernh., 1802.
Onoclea [illegible]sorbifolia Sw., 1806.
Ragiopteris onocleoides Presl., 1836.

Fronds scattered; the sterile ones long-stalked, stipes often reach 60 cm. high, ovate in outline, once pinnate below and deltoid-pinnatifid toward the apex, 10-30 cm. long; pinnules oblong-lanceolate, sinuately lobed or nearly entire segments, veins reticulate with fine meshes; fertile fronds, appear in about mid-summer, shorter than the sterile, contracted, closely bipinnate, the pinnules rolled up into little green berry-like bodies enclosing the sori stringing along the midribs, indusium imperfect, very delicate, hood-shaped, attached to the base of receptacle.

North America from Florida northward to Canada, Korea, Japan, China: Szechwan, Manchuria, Chihli - Tungling.

Tribe III. Oleandreae

Sori roundish or oblong, dorsal and mostly near the base, mostly uniserial or irregular; indusium reniform, fastened by a round sinus and opening extrorsely. Spores longish-reniform. Fronds simple, articulate to the rhizome; veins closely parallel, free, forked or often anastomosing towards the margin.

18. Oleandra, Cavanilles, Anales de Historia Natural 1. 115, (1799).

Type: Oleandra neriiformis Cav.

Sori round, placed in a row near the base or below the center of the compact free veinlets some distance from the midrib; indusium reniform. Stipes scattered or closed, very short, generally 1.2-7.5 cm. long, articulated near the base; fronds entire, lanceolate-elliptical, generally of subcoriaceous texture. Rhizomes scandent or suberect, wide-spreading, clothed with appressed or spreading scales.

A small genus of about 14 species almostly all confined to the Tropics, 2 in China; distinguished from Dryopteris or Nephrolepis by its simple entire fronds, and very short stipes articulated near the base.

Key to species

I. Scales on the rhizome spreading; frond of rather a thin herba-

ceous texture, glabrous on both sides...O. wallichii

II. Scales on the rhizome adpressed; frond of rather
a subcoriaceous texture, more or less shortly pubescent on both sides.......................O. cumingii

1. Oleandra wallichii (Hooker) Presl. Tent. 78, (1836); HKBK. 303; Matthew 374, (1911).

Aspidium wallichii Hooker, Exot. Fl. 1. t. 3. 1823.
Neuronia asplenioides Don, 1825.

Rhizomes trailing horizontally, the scales fibrillose, spreading, ferruginous; stipes close or scattered, 1.2-45 cm. long, jointed close to the base; fronds 15-30 cm. long, 1.8-3.7 cm. broad, the apex acuminate texture papyraceo-herbaceous or subcoriaceous; rachis naked or scaly; both sides naked; sori in single rows close to the midrib; involucre 2/3 mm. broad, ciliate, opening towards the edge.

India, Formosa, China: Yunnan.

Var. lepidota Christ, Bull. Geogr. Bot. Man. xvi. 140, (1906); Matthew 374 (1911). Rachis densely fimbriate with numerous elongate lanceolate brown scales as in Oleandra whitmeei Baker; scales on the rhizomes flaccid, lanceolate, white, while the rhizomatic scales in Oleandra whitmeei stiffer, squarose.

Szechuan.

2. Oleandra cumingii J. Sm. Jour. Bot. 3. 413, (1841); Presl. Epim. 41, (1849); HKBK. 303; Matthew 374, (1911).

Oleandra chinensis Hance, 1862.

Rhizomes trailing horizontally, clothed with appressed linear
(F. 70).
scales; stipes close or scattered, 5-7.5 cm. long, articulated at distance above the base; fronds 30-45 cm. long, 2-3.7 cm. broad, narrowed gradually towards both ends, slightly pubescent; sori in two irregular rows near but not quite close to the midrib; indusium firm, oblique; texture subcoriaceous, shinning green.

Assam, Philippines, Malaya, Luzon, India, Malesia, Hongkong, China: Kwangtung-Tsing Yuen Hsien.

Oleandra chinensis Hance is a form of the above with fronds of thinner texture, more hairy on both surfaces and sori in very irregular wavy lines not so near to the midrib.

Tribe IV. Aspidieae.

Sori oblong, round or reniform, medial or terminal indusium superior; of the same shape as the sorus, fastened by a longitudinal axis, or central point or at the top of more or less deep sinus, opening all round the edge or nearly so, or often wanting. Veins free or reticulate. Stipes not articulate to the rhizome. Spores bilateral.

Key to Genera

1. Fronds flabellato-dissected. Indusium wanting. Veinlets copiously anastomosing.
  2. Main veins dichotomously branched; sori small, punctiform, scattered................................19. Dipteris
  2. Main veins sympodially branched; sori large, oblong, uniserial close to the main veins.....20. Neocheiropteris
1. Fronds otherwise divided, 1-30 or more pinnate, sometimes simple and entire. Indusium reniform or peltate, or often wanting.
  2. Veins free
    3. Leaflets unequal-sided, the upper base auriculate or broadly cuneate or subtruncate, the lower obliquely cut away. Indusium round, rarely reniform.......... ....21. Polystichum
    3. Leaflets more or less equal-sided.
      4. Fronds dimorphous, 1 or more pinnate............... ....22. Polybotrya
      4. Fronds uniform
        5. Fronds simple pinnate; pinnae deeply cordate and articulate to the rachis. Veins simple or forked. Indusium round or reniform...23. Cyclopeltis
        5. Fronds generally variously divided; pinnae not articulate to the rachis. Main veins pinnate. Indusium reniform, rarely round or often wanting...............................24. Dryopteris & Lastrea, Phegopteris and Leptogramme.
  2. Veins more or less anastomosing.
    3. Fronds dimorphous, simple entire or 1-pinnate.......... ....25. Leptochilus
    3. Fronds uniform, various divided.
      4. Lower veins of contiguous groups forming a costal row of regular, usually triangular areolae on each side the apice of which with (or without) an excurrent veinlet, which is either free or joining in the angle of the superior pairs of veins, which often form 1 or more rows of regular, usually rhomboidal areolae between the costal ones and margin. Indusium reniform, rearely round or more often wanting.............. ....24. Dryopteris & Cyclosorus, Goniopteris, Stegnogramma and Meniscium.

4. Veins not anastomosing as above.
    5. Excurrent soriferous free veinlets 2-3 to each areola. Sori not compital, Indusium round..........................25. *Cyrtomium*
    5. Excurrent soriferous free veinlets wanting or 1 to each areola, or the soriferous veinlets spreading towards various directions. Sori often compital. Indusium round or reniform. ....26. *Aspidium*

19. Dipteris Reinwardt. Syllog. Plant. 2. 3, (1824).

Type; Dipteris conjugata Reinw.

Fronds adherent to the caudex, flabellate in two halves which are deeply lobed from their circumference in the direction of the base, secondary veins forming many areolae, including free or netted veinlets; sori punctiform, numerous, small, scattered or in a single series (Greek, "two and ferns" - the fern-like fronds in two parts).

6 sp. all endemic in tropical Asia, 2 recorded in South China.

Key to Species

I. Frond to 26 cm. long, 25 cm. broad, more shallowly cleft into fewer much broader lobes; the ultimate segments broad-ovate, 3-4.5 cm. broad; veins 2-2.5 cm. apart..1. *D. chinensis*
II. Frond much larger, 30-10 cm. long, more deeply cleft into more and narrower lobes, the ultimate segments oblong-lanceolate, below 1.5 cm. broad; veins 1 cm. apart..2. *D. conjugata*

1. *Dipteris chinensis* Christ Bull. Geogr. Bot. Man. 109, c. fig. et tab; (1904) Matthew 358, (1911).

Principal veins distinctly brown, cylindrical, convex; lobes not deeply cut 1/3 down, imbricato-confert, broadly ovate, obtusish; teeth broad subacute; sori large, ochreo-yellow.

Differs from Dipteris conjugata by dimensions about one-third as small, the principal veins more robust areolae more distinct/ with more open angles, the interstices between veins twice as broad, the lobes much less deeply cut, hardly reaching [illegible] way down the limb, imbricate with broadly ovate-obtusish sinuses between them and by more broad teeth. The sori much larger, ochreo-yellow. The dimension of the halve of the adult soriferous frond: 25 cm. long, [illegible] cm. broad, the middle lobes 10 cm. long, 7 cm. broad, lobules 4 cm. long, [illegible] cm. broad, the ultimate segments 2 cm. long, sori [illegible] mm. in diameter.

A very distinct species by its much fewer and broader lobes into which halves of the frond are cleft. While D. conjugata are more finely cut into narrower and longer lobes.

Henry's specimen N. 9041 B. from Mentze, Yunnan, should be considered as identical with the species, except with deeper and broad round sinuses.

2. *Dipteris conjugata* Reinw. Syll. Pl. 2. 3. (1824); Christ 123;
   NFFL. 204; Matthew 359, (1911).

Polypodium conjugatum Klf., 1827.
?Phymatodes conjugatum Presl., 1836.
Polypodium dipteris Bl., 1828; HKEK. 362.
Polypodium horsfieldii R. Br., 1828.

Rhizomes ~~s~~ creeping, densely clothed with blackish, adpressed, subulate scales; stipes strong, 1-1.66 m. long, often quite apart; fronds 5-40 cm. long, and much broader, the main lobes reaching three-quarters of the way down, the edges sharply toothed; texture sub-coriaceous; upper surface dark green, lower very glaucous; main veins very prominent, dichotomously forked; areolae copious; sori very minutes scattered irregularly, especially plentiful near to main veins, confluent not gummy.

(P. 75).
not gummy.

Polynesia, Formosa, Loochoo, Philippine, Formosa, China: Yunnan, Kweichow.

The other Asiatic species of the genus not yet reported from China, and the occurrence of ~~it/~~ which is not improbable is Dipteris wallichii (R. Br.) Moore from North India.

20. Nocheiropteris Christ, Bull. Soc. Bot. France,
    52. Mem. 1. 21, (1905).

(Cheiropteris Christ, Bull. Boiss. Vo. (1898).
876. c. pl.).

Type: Polypodium palmatopedatum Baker.

Rhizomes creeping, hypogaeous, covered with ovate acuminate, ciliate, reticulated scales with thickened-cells in the middle; stipes solitary, erect, not articulate at the base; leaves palmatifid, costae 3, springing from the top of stipe, the middle one erect, the two lateral ones patent; the secondary costule many, almost parallel, erect, branching laterally from the one side of the two lateral main costae, except on the lower side of the auricles; segments acuminate almost dark veinlets finest, forming many oblong areolae with included clavate often bidigital veinlets; texture herbaceous; sori exindusiate, close to the costae, large, oblong, receptacles oblong, thickened, dorsal on dilated veins, sporangia numerous, obovate, brown, scarcely diaphanous, shortly pedunculate with a vertical incomplete annulus, each containing about 17 bilateral subreniform, smooth, not cristate, pellucid, orange yellow spores. A. monotypic genus, endemic in Yunnan, discovered by A. Henry; in habit, it is intermediate between Dipteris Reinw. and

Polypodium § Pleopeltis Bedd.

Neocheiropteris palmatopedata (Baker) Christ in Bull. Soc. Bot. Fr. 52: Mém. 1. 21 (1905); C. Chr. Ind. 432 (1906).

Polypodium palmato-pedatum Baker, Kew Bull. (1895) 232.
Cheiropteris henryi Christ, Bull. Boiss. 6: 873 (1898).
Diels in Nat. Pfl. Fam. I. 4. 189. Fig. 98 (1902).
Cheiropteris palmatopedata Christ, Bull. Boiss. 7: 21. t. 1 (1899).

Rhizome epigeous, wide-creeping, about 7 mm. thick, clothed in large lanceolate, cuspidate membranaceous sordid brown imbricate ciliate dense scales; stipes distant, 30-45 cm. long, stiff, naked throughout, stramineous, terete underneath, deeply 3-striate above; frond flabellate quadrate, pedate-palmatifid, base cuneate, 25-30 cm. long and broad or broader; texture chartaceous, green and glabrous above, sparsely clothed with minute brown scales beneath; segments 10-20 cm. long, upright, lanceolate, slightly imbricate, the middle ones 17-20 cm. long, 2.5-3 cm. broad, the lateral ones much smaller, margin entire; costa prominently raised below and less so above; veins anastomosing into small hexagonal areoles; sori superficial, usually confined to the lower half of the segments, the outermost segments sterile or at best sparsely soriferous, close to the costa, the lower ones oblong or linear-oblong, the upper ones globose.

Distributions: Yunnan, Szechwan.

This unique fern was first discovered by Pere Delavay in the
(P. 74).
mountains in Tapingtze, Yunnan, September 4th. 1883, and by A. Henry at Mile in the same province about fifteen years later, but it was the latter's specimen which received the first attention from Baker, who called it Polypodium palmatopedatum, while former's specimens remained unknown in the Museum d'histoire naturell de Paris until about 1905 when it was identified by Christ, who changed his Cheiropteris palmatopedata to the present name (1.) This fern must be considered as one of the most outstanding additions to our Chinese flora discovered by early European plant explorers in this country. As already quite throughly discussed by Christ (2) the present fern is entitled a systematic place between Dipteris and Polypodium § Pleopeltis, both of which are represented in Yunnan and growing side by side with our plant there. However, the plant differs from either of its relatives by large elongated costal sori and, particularly, by the broad and incrassate receptacle, formed of the dilatation of the dorsal part of the costal veins, on which the sorus is borne.

21. Polystichum Roth. Rom. Mag. 21. 106, (1799); Bernh. Schrad. Journ. (1800), 298.

Type: Polypodium aculeatum L.

Sori round or subglobose, dorsal or terminal on veinlets; indusium orbicular, fixed by the centre; fronds uniform, pinnate, bipinnate or decompound, pinnae or pinnules auricled and lobed on the upper side at base, dentate or serrate, teeth generally rigidly spinulose or mucronate; texture generally coriaceous, evergreen; veins simple or pinnately forked, venules free, the lower exterior branch or more of the group soriferous; rhizome coarse, stout, short erect or oblique; stipes tufted at the crown of the rhizome, generally, like rachis, densely chaffy scaly. (Greek "many" and rows," possibly referring to the generally multiseriate sori).

A genus of about 150 species with many varieties and hybrids, widely dispersed over temperate and subtropical regions of both hemispheres, about 65 well-defined species are known from China. Coarse, mainly terrestrial rigid ferns of rocky forest, the woody rhizomes and often the stipes copiously paleaceous.

Key to species

1. Fronds simple pinnate
  2. Only the lower part broadly pinnate, the upper half subentire or entire..................1. *P. basipinnatum*
  2. Fronds pinnate throughout, except the very apex.
    3. Fronds elongated and gemmiferous or rooting at apex.
      4. Indusium large, bullate.
        5. Fronds to 15 cm. long, to 2 cm. broad...2. *P. craspedosorum*
        5. Fronds above 30 cm. long, 4.5 cm. broad...3. *P. leucochlamys*
      4. Indusium smaller, not bullate.
        5. Indusium persistent; texture of frond thin herbaceous...............4. *P. maximowiczii*
(P. 75). 5. Indusium deciduous; texture of frond coriaceous......
          6. Pinnae 1½ cm. long, triangular...5. *P. stenophyllum*
          6. Pinnae above 5 cm. long, lanceolate falcate...............6. *P. lepidocaulon*
    3. Fronds not rooting nor elongated at apex.
      4. Pinnae usually above 3 cm. long.
        5. Texture hard coriaceous
          6. Pinnae pectinate-imbricate with mucronate apex...............7. *P. falcinellum*
          6. Pinnae with about their space between, with acute apex...8. *P. falcinellum*
        5. Texture not hard coriaceous.
          6. Sori confined to the anterior margin; texture flaccid herbaceous..9. *P. ichangense*

6. Sori on both sides of the midrib; texture rather rigid........10. P. xiphophyllum

4. Pinnae usually below 2 cm. long.
   5. Fronds more or less attenuate towards the base
      6. Texture thick coriaceous; sori hidden in dense brown scales...11. P. duthiei
      6. Texture thin herbaceous, glabrous beneath.
         7. Fronds above 20 cm. long...12. P. hecatopteron
         7. Fronds below 10 cm. long.
            8. Sori costular...13. P. franchetii
            8. Sori not costular.
               9. Margin inciso-serrate.............................14. P. michelii
               9. Margin aristato-serrate..............................15. P. parvulum
   5. Fronds not or scarcely attenuated towards the base
      6. Texture thin herbaceous.
         7. Pinnae about 60 on each side, minutely serrulato-crenulate..16. P. dielsii
         7. Pinnae below 30 on each side, lobated.........................17. P. lacerum
      6. Texture subcoriaceous to coriaceous
         7. Pinnae falcate
            8. Stipes clothed in large lanceolate scales; pinnae spinuloso-serrate.....................18. P. lonchitis
            8. Stipes less scaly scales small; pinnae not spinuloso-serrate.
               9. Margin crenulate...............................19. P. blinii
               9. Margin mucronato-serrate.
                  10. Plants rarely above 15 cm. long.....20. P. obliquum
                  10. Plants over 30 cm. long.............21. P. auriculatum
         7. Pinnae not falcate.
            8. Fronds below 10 cm. long.
               9. Pinnae not auricled on the anterior base, with only 4-5 deltoid-teeth on the upper margin.................................22. P. lanceolatum
               9. Pinnae strongly auricled, spinulosely serrated all round the margin...................23. P. atkinsoni.
            8. Fronds much longer
               9. Indusium large, persistent.......................24. P. gracilipes.
               9. Indusium smaller, deciduous.......................25. P. deltodon

1. Fronds bipinnatifid to bipinnate.
2. Fronds bipinnatifid, scarcely fully bipinnate.
3. Pinnae cordate, crenate into obtuse rounded lobes......
..........................26. P. diplazioides
3. Pinnae not cordate, margin deeply pinnatifid down to
costa..
4. Texture thick coriaceous.
5. Pinnae below 10 mm. long..............................
......................27. P. lachenense
5. Pinnae above 5 cm. long...............................
......................28. P. lobatum
4. Texture papery.
5. pinnae with 1 rarely more free basal auricle or
pinnule.............29. P. otophorum
5. Pinnae with more basal pinnules.
6. Frond 24 cm. broad............................
................30. P. bonatianum
6. Frond below 3 cm. broad.........................
..................31. laveillei
2. Fronds usually fully bipinnate.
3. Basal pair of pinnae much the largest and pinnate, the
rest of the pinnae are simple...........................
...........................32. P. tripteron
3. All the lateral pinnae regularly pinnate.
4. Fronds gemmiferous at or near apex...................
..........................33. P. chunii
4. Fronds not gemmiferous at apex.
5. Fronds scarcely over 5 cm. broad.
6. Texture hard coriaceous.......................
..................34. P. acanthophyllum
6. Texture soft or herbaceous.
7. Stipes capillary wiry, naked..............
..............35. P. capillipes.
7. Stipes thick, rigid, scaly.
8. Glabrous on the under side of the frond.
...........36. P. braunii
8. Pubescent or scaly on the under side of
frond......
9. Pinnae broadened at both sides of the
base...37. P. woodsioides
9. Pinnae auricled on the anterior
base and cut away on the posterior.
........38. P. molliculum
5. Fronds above 6 cm. broad.
6. Fronds narrowed towards the base...............
.................39. P. prescottianum
6. Fronds not or scarcely narrowed towards the
base.
7. Stipes and rachis clothed in black setae..
..............40. P. tsus-simense
7. Stipes and rachis clothed in brown scales or
setae.
8. Indusium persistent.....................
...........41. P. yunnanense
8. Indusium deciduous or exindusiate.

9. Plants exindusiate......................
...............42. P. longipaleatum
9. Plants with deciduous indusium
10. Fronds deltoid, texture coria-
ceous...43. P. cyclolobum
10. Fronds not deltoid, texture thin-
ner.
11. Pinnules aristato-serrate.
~~11~~ 12. Rachis nearly naked......
.44..P. thomsoni
12. Indusium entire..........
45. P. aculeatum
(P. 77, .
11. Pinnules not aristato-serrate.
12. Rachis nearly naked......
46. P. nepalense
12. Rachis densely scaly.....
47. P. squarrosum

1. Fronds tri- or more-pinnate.
2. Fronds broadly deltoid, above 15 cm. broad.
3. Texture subcoriaceous.............48. P. [illegible]
3. Texture thin papery................49. P. henryi
2. Fronds oblong-lanceolate, below 5 cm. broad.
3. Pinnal segments linear-subulate, scarcely to 1 mm. broad.
4. Veins simple in the ultimate segment
5. Paleae on the stipes unequal-sized.................
...................................50. P. alcicorne
5. Paleae on the stipes uniform.
6. Pinnae about 30 cm. on each side...............
...................................51. P. omeiense
6. Pinnae to 20 on each side..52. P. martini
4. Veins forked in the ultimate segment.................
...................................53. P. wattii
3. Pinnal segments much broader
4. Paleae on stipes and rachis dark shining black.....
...................................54. P. matthewii
4. Paleae on stipes and rachis brown.
5. Paleae dimorphous...............55. P. bakerianum
5. Paleae uniform..................56. P. bissectum

1. Polystichum basipinnatum (Baker) Diels, N.Pfl. 189, (1899); Matthew 365, (1911).

Aspidium basipinnatum Baker, Jcb. XXVII. 176, (1889).

Caudex erect; stipes densely tufted, erect, slender, stramineous, 7.5-15 cm. long, clothed throughout with large spreading ovate brown membranaceous paleae; fronds lanceolate, sometimes lengthened out and rooting at the tip, 15-24 cm. long, 1.8-2.5 cm. broad, moderately firm in texture, naked above, paleaceous over the surface, especially on the midrib beneath, pinnate at the base, with oblong simple entire pinnae 6-12 mm. broad, which are attached to the rachis by a broadly adnate base, pinnatifid upwards; veins free, copiously pinnate in the pinnae with ascending

veinlets; sori biserial in the pinnae and lobes, dorsal on the veins, nearer the midrib than margin; indusium small, fugacious.

Hongkong, Kwangtung - North River.

2. Polystichum craspedosorum (Maxim) Diels, E.P.F. 189, (1899); Matthew, 305, (1911).

Aspidium craspedosorum Maxim., Bull. Acad. Sc. Petersb. 15, 231, 1871; [illegible] 482; Christ 255.
Dryopteris craspedosora O. Ktze, 1891.
Hemesteum craspedosorum Lev., 1915.

Rhizome short, erect, stipes densely tufted, 2.5-3.7 cm. long, densely clothed with spreading, paleae, which are lanceolate, membranaceous, ferruginous; fronds small, lanceolate, simply pinnate, glabrous, 7.5-15 cm. long, 1.8-2 cm. broad at middle, apex often with roots;
(F. 78).
pinnae sessile, numerous, unequilaterally lanceolate, base auricled above the lower cuneate, truncate on the lower side, the lower ones remote and gradually smaller; veins free, obscure, erecto-patent, sori between margin and costa, uniseriate, often on the upper half of the pinnae, the lower half often only bears one single sorus; indusium large, peltate, persistent.

Korea, Japan, China: Manchuria, Hupeh, Szechwan, Chihli, Shensi, Kansu, Kweichow, Chekiang - Tien-moo Shan.

A very distinct species, widely spread in N. E. Asia, remarkable for its very large persistent bullate indusium and often rooting apex of the frond.

Quite variable in cutting; a specimen collected by J. Esquirol (No. 3204) from Kweichow with pinnae cut ½ way down and the basal auricles cleft down to a short distance from the midrib or free from it with rather broad sinus, texture thinner, probably represents an extreme form of this species. Plants to 15 cm. long.

3. Polystichum leucochlamys Christ, Bot. Gaz. 51. 351, (1911).

Rhizomes short, strong, thick, paleaceous, like stipes and rachis clad in large patent, ovate-acuminate brown fimbriate-ciliate scales 4 mm. long, except a gradually diminuate and angustated fasciculate, and lacerate on the rachis; leaves fasciculate; stipes 8-12 cm. long green or stramineous, 2 mm. thick. Lamina lanceolate-caudate, angustate towards base, rachis weak and arcuate, 30 cm. long, 4.5 cm. broad apex naked, elongate, provided with a viviparous gemma, pinnate; pinnae 30-40 on each side, approximate or quite distant, the lowest ones diminute and deflexed, the upper ones patent, lanceolate-falcate, obtuse rarely acute, subsessile, 2 cm. long, 0.5 cm. broad at base,

base unequal, cuneat on the posterior side, acutely auriculate on the anterior side, crenate or decurrently serrate; veins strongly obliquo; sori rounded, marginal, uniseriate, borne on the anterior margin, indusium large, 2 mm. across, scarioso-hyaline, imbricate, bullate, white-diaphaneous, umbilicate, margin minutely fimbricate; surfaces setulose; texture herbaceous, color light green.

Yunnan - Moup'in; W. Szechwan; Hupeh - Fang hsien.

4. Polystichum Maximowiczii (Baker) Diels, Pfl. 189, (1899); Matthew 387, (1911).

Polypodium Maximowiczii Baker, Hdbk. 504.
Ptilopteris Maximowiczii Hance, 1884.
Phegopteris Maximowiczii Christ, Farne. Erde. 271, 1897.

Stipes 6-7.5 cm. long, tufted, naked, castaneous; fronds lanceolate, simple pinnate, 20-30 cm. long, 1.5 cm. broad at middle, narrowed to both ends, often rooting at the tip; pinnae sessile, lanceolate, subacute, incise-crenate, 0.7-5 mm. broad, auricled on the upper, cuneate-truncate on the lower side at the base, many lower reduced and deflexed; rachis stramineous, naked; texture thin but firm; surfaces naked, dark-green; veins simple, erect-patent, forked in the auricle, one to each lobe with a minute terminal sorus.

Nagasaki, Japan, Loochoo, China: South Anhwei - Hwang shan.

Collected for the first time from Hwang shan, Anhwei (1925) by the author.

(P. 79).

5. Polystichum stenophyllum Christ, Bull. Soc. Fr. 52. Mem. I. 27, (1905); Matthew 388, (1911).

Aspidium caespitosum Wall var. stenophyllum Franch. Mss.
Polystichum deversum Christ, Bot. Gaz. 51; 353. 1911.

Rhizomes erect, strong, clothed with ovate large brown scales; leaves fasciculate, stipes 3-7 cm. long, strong, fusco-stramineous and with rachis provided with ovate and lanceolate subulate brown scales; fronds linear-lanceolate, 20-30 cm. long, 2½-3 cm. broad, acuminate proliferous and radicant below the apex; pinnae sessile, the lower ones deflexed, pinnae numerous (about 40 on each side of the rachis), 1½ cm. long, base 7 mm. broad, triangular, aristate-acute, acutely auriculate on the upper base, auricles with aculeate-aristate acumen, margin almost entire; texture coriaceous, color flavescent, the lower surface regularly clothed with brown lan-ceolate appressed scales; veins most confert in pinnules, forked from the lower part, the upper ones pinnate, simple, conspicuously impressed; sori minute, medial, uniseriate, indusium fugacious, almost absent.

Hupeh, Szechwan, East Tibet, Yunnan- Moupine

Resembles P. deltodon in size, color and teeth, deffers by the gemmiferous apex of the rachis, the rather numerous adpressed scales and more triangular, often reflexed pinnae.

6. Polystichum lepidocaulon (Hooker) J. Sm. Ferns Brit. and For. 286, (1866); NPFL. 190; Matthew 386, (1911).

Aspidium lepidocaulon Hooker, Sp. 4. 12 t. 217, 1862; HKBK. 250.

Dryopteris lepidocaulon O. Ktze., 1891.

Stipes tufted, 15-23 cm. long, weak, densely clothed with large cordate brown scales; fronds 30 cm. or more long, 10-15 cm. broad, apex often elongated and radicant at the point, simple pinnate; pinnae 5-7.5 cm. long, 1.2-1.8 cm. broad, lanceolate falcate, not toothed, the two sides unequal, the upperones with a triangular auricled at the base; texture subcoriaceous; rachis densely scaly like the stipes, lower surface with scattered scales; veins obscure, sometimes slightly connected; sori principally in two rows a short space from the midrib.

Japan, Korea, Formosa, China: Chekiang, Anhwei.

7. Polystichum fimbristum Christ, Bull. Geogr. Bot. Man. 237, (1906).

Rhizome oblique, hard, tough, thick as man's finger, clothed with lanceolate-subulate flaccid brown entire scales 1 cm. long; leaves fasciculated, the stipes as thick as goose's quill, rigid 20 cm. long, scales erect or retrorse patent, ovate-acuminate, 6 mm. long, 3 mm. broad, diaphaneous, coppery-yellow, lucid long-fimbricate along margin, sometimes densely covered with linear-subulate castaneous scales 6 mm. long with minutely ciliate margin; fronds 50 cm. long, acuminate, 6 cm. broad, linear-lanceolate, not attenuate towards base; simply pinnate, pinnae pectinate, almost imbricate, only the lower ones with an interspace 1 cm. broad about 50 on each side, oblong-rhomboidal, obtuse, 32 mm. long, 1 cm. broad at base, sessile, unequal, cuneate on the lower side at base, rectangularly and acutely auriculate on the upper side, subfalcate, very minutely denticulate, tooth aristulate, veins numerous, close, oblique, forked; sori impressed, minute, 1 mm. broad, about 15 on each side, almostly medial; indusium keeled, dark-brown; rachis pubescent with castaneous setiform scales, the upper surface of the frond glabrous, lucid, the lower surface furfuraceous with adpressed reddish hairs provided with incrassate base and ciliate (P. 80).
margin; texture hard, coriaceous, thick, color ochraceo-rufous when dried.

Kweichow.

8. Polystichum falcinellum (Sw.) Presl. Tent. 83, (1836); NPFL. 189; Matthew 386, (1911).

Aspidium falcinellum Sw., Syn. 46, 243, 1806; Mett. n. 94; HKBK. 249, HK. Sp. 4. 12 t. 217; Chr. 256.
Dryopteris falcinellum O. Ktze, 1891.
Polystichum maderense Johns, 1866.

Stipes tufted, 10-20 cm. long, densely clothed, especially below, with blackish-brown lanceolate scales; fronds 30-45 cm. long 10-15 cm. broad; central pinnae with about their own space between, 7.5 cm. long, 6 mm. broad, the point acute, the edge finely not spinosely serrated, the upper side bluntly auricled, the lower obliquely truncate at the base; texture very coriaceous; rachis usually scaly; veins inconspicuous; sori in two long rows.

Madeira, China: Hupeh.

9. Polystichum ichangense Christ, Bull. Soc. Fr. 52. Mem. 1. 28, (1905); Matthew 386, (1911).

Aspidium auriculatum var. ichangense Baker, 1888.

Rhizomes erect, short; leaves fasciculate, stipes 5 cm. long, slender, and like rachis clothed with short ovate brown scales; fronds 13-20 cm. long, 1.8-2 cm. broad, linear-lanceolate, caudate-acuminate, pinnae about 35 on each side under the serrated apex, moderately close, trigono-rhomboidal, subsessile, acute, acutely auriculate on the upper base, anterior side and apices deeply serrate 4 mm. broad, at base 4 cm. long, teeth subaristate; veins pinnate, the lower ones forked; sori 4, uniseriate on the anterior margin, 1 mm. broad, rounded, brown, inducium fugacious, reniform-orbicular, surface smooth; texture flaccid, herbaceous, color light green.

China: Hupeh - Ichang Gorge.

10. Polystichum xiphophyllum (Bak.) Diels, NPFL. 189, (1899); Matthew 388, (1911).

Aspidium xiphophyllum Baker, Job. XXVI. 227, (1888).
Polystichum monotis C. Chr., Ind. 584, (1906).
Aspidium onotis Christ, Bull. Soc. Bot. Ital. 294, 1901.
Polystichum praelongum Christ, Bull. Geogr. Bot. Mans. 260. 1902; Matthew 387, 1911.

Caudex stout, erect, basal paleas linear or lanceolate, bright brown. Stipes tufted, 10-13 cm. long, clad in only a few spreading paleae near the base; lamina oblong-lanceolate, rigid, glabrous, simply pinnate, under 30 cm. long, 7.5-10 cm. broad, green on both sides; rachis more or less furnished spreading linear or subulate black scales; pinnae about 20- jugated, the upper sessile, the lower nearly so, lanceolate, 3.7-5 cm. long, 8 mm. broad, cut away on the lower side at the base, with

a free or adnate auricle on the upper, finely pinnate with about 2 veinlets on a side in the center of pinnae; sori uniserial on each side of themidrib of the pinnae; inducium small, glabrous, deciduous.

Hupeh, Szechwan - Omei Shan.

A very distinct species, allied to Polystichum munitum (P. 81).

11. Polystichum duthiei (Hope) C. Chr. Ind. 72 (1905), 581 (1906), Medd. Goteb. Bot. Tradg. I: 64 (1924); Hand-Mzt. in Symb. Sinc. VI. 26 (1929).

Aspidium duthiei Hope, Journ, Bomb. Nat. Hist. Soc. 12: 532, t. 6 (1899).

Polystichum glaciale Christ, Bull. Soc. Bot. Fr. 52. Mem. I. 28 (1905).

Sorolepidium glaciale Christ, Bot. Gaz. 51: 35, c. fig. (1911).

Rhizome thic, erect, densely rooted; leaves tufted (4-7 together) stipes 5 cm. long, covered with dense dimorphic scales, the one short fibrillose, the other broad ovate, acuminate, 6 mm. long, ochraceous-yellow; frond 12-25 cm. long, 1.5-2.5 cm. broad at the middle, linear-lanceolate, tapering to both ends, simply pinnate, rachis thickly clothed with lanceolate subulate scales; pinnae confert, the lower ones much reduced, ovate, 4 mm. long, the middle ones to 1.2 cm. long, oblong, equal, margin strongly reflexed, crenate, truncate or cordate at the base, texture thick coriaceous, greenish-flavescent, villosed with whitish appressed setaceous-scales above, the under surface clothed in dense~~ly~~ large lanceolate brown scales from the costa and the smaller ones from the veins, the scales lanceolate-linear, scarious, 2 mm. long; veins entirely hiddened, forked or subpinnate near the base; sori 3-4 on each side of the costa, almost rounded, hidden, inducium large, thin, brown, very fugaceous.

Distribution: Yunnan, Szechwan, also N. W. India.

Hope's type from N. W. India~~n~~ was a much smaller plant than those from W. China. In general habit, this species resembles P. lachenense(HK.) Bedd. differs by much short stiff stipe and stout rachis, the dense covering of disproportionally large scales, the adpressed white setae on the upper surface and thick coriaceous texture. Its first record from China was credited to Pere Delavay, who found it in 1884 at the foot of a glacier in Lu-k'ang, Yunnan, for, which reason, Christ called the plant P. glaciale by referring to Hope's P. duthiei. to which it was finally reduced by Dr. Christensen.

12. Polystichum hancatopteron Diels in Engl. Jahrb. 29: 193 (1900); C. Chr. Ind. 582. (1906); Matthew in Journ. Linn. Soc. 39: 386 (1911).

Polystichum auriculatum Presl. var. stenophyllum Baker, Journ. Bot. (1888) 227.
Hemesteum hecatopterum Lev., Flore du Kouy-tscheou 496 (1915).

Rhizome short, erect, thick as raven's quill, clothed like the stipes in moderately dense membranaceous brown dimorphis scales, the one broad lanceolate, the other linear-subulate, both both are hair-p/ointed; stipes tufted (3-4 together, slender, terete beneath, bi-sulcate above, 5-15 cm. long; frond elongate linear, gradually tapering towards both ends, 20-35 cm. long, 2-3 cm. broad at the middle, pinnate; pinnae 40-50 on each side, 1.2-2 cm. long, ½ cm. broad, close or subimbricate, subrhombo-oblong, gradually deflexed downward, but the upper ones horizontally patent, the upper side straight and parallel to the rachis, much produced into a triangular auricle, provided at the apex with a bristle, the lower side cut away to the costa, apex rounded, margin spinuloso- or aristatato-denticulate; veins inconspicuous, fine, lateral veinlets pinnate, regularly once forked, except those towards the apex which are simple, the upper pinnae fertile; sori between the costa and margin, mostly 6-10 on the upper side and none or 2-3 on the
(P. 82).
lower side of the costa, indusium rounded, peltate, smaller than the sori, attached by the centre, which is slightly depressed and blackish. sori, attached by the centre, which is slightly depressed and blackish.

Distribution: Szechwan.

This is a uniquely distinct species, well marked by short scaly stipe and pectinately close oblong pinnae with 5-10 often incurved long-aristate teeth on each side, the lower pinnae considerably abbreviated and strongly deflexed. This pretty fern was first discovered by Rev. Ernst Faber in Omei Shan, early in 1886 and described 2 years later by Baker as Aspidium auriculatum Sw. var. stenophyllum in following diagnosis "Approaching to Aspidium lonchitisin habit, with a frond a foot long and scarcely above an inch broad at the middle, with subrhomboidal spinulose conspicucusly auricled pinnae much cut away on the lower side of the midrib" (cf. Journ. Bot. xxvi. 227) (1888). It was, however, not until 1900, when Herr von Rosthrn's plants collected in Papao Shan, in Nan-chuan, S. E. Szechwan, in 1891, was brought under the notice of Dr. Diels who gave the name as it bears today, not quite sure as to the identity of this species to Baker's var. stenophyllum. I have seen the type of var. stenophyllum (Faber No. 1305) in Hongkong Herbarium and found it is typical of Diels' species except with longer stipe (-12 cm.). Ample materials collected by Wilson in W. Szechwan show that fronds even from same rhizome vary from 2-3-4 cm. in width, and it is with the broadest frond that the species somewhat approaches *P. auriculatum* Presl. in habit but for long-aristate teeth and more sharpo auricle. Evidently a fairly common fern in Szechwan, particularly in Omei Shan.

Var. marginale Christ, Bull. Geog. Bot. Man. xiii. 114, (1904); Matthew 386, (1911). Differs from the type in sori placed marginal on the anterior side of the pinnae; while the sori in the type borne midway between margin and costa.

Kweichow.

13. *Polystichum franchetii* Christ, Bull. Soc. Fr. 52 Mem. 1. 28, (1905); Matthew 386, (1911).

Aspidium thomsonii var. gracilis Franch. MSS.

Closely allied to Polystichum ichangense but differs in stipes being filiform, fronds obtuse, dimensions half as large, distinctly petiolulate, pinnae 6 mm. long, 3 mm. broad, obtuse, with much shorter teeth, more irregularly aristate, auricles obtuse sori 4, not marginal, relatively large, 1 mm. across, orbicular, indusium round, oblique, persistent, gray.

Szechwan.

It is a linking species between the group of *deltodon* and *crassipedosorum*.

14. *Polystichum michelii* Christ, Bull. Geogr. Bot. Man. 16, (1910); Matthew 387, (1911).

Hemesteum michelii Lev. 1915.

Rhizomes erect, short, finely radicose clad with large ovate acute flaccid-yellow scales 8 mm. long, 3 mm. broad; leaves densely fasciculated, stipes short, slender, with rachis clothed with flexuous subrigid patent subulate yellow dense scales 3 mm. long; lamina lanceolate, acuminate, not proliferour, 6 cm. long, 1-1½ cm. broad, pinnate; pinnae close, diminuate towards base,
(P. 83).
15-18 on each side below the serrate-incised apex, very unequal, i. e. the lower side of the base cuneate, the upperside auriculate, petiolate, the upper side of the obtuse auricles cut down almostly to the costa, the upper ones rhomboid-obtuse, 5-9 mm. long, serrate-incised; sori numerous, touching each other, light brown; indusium feeble, scarcely corrugated, texture flaccid herbaceous, color ochraceous-green, both surfaces almost naked.

Kweichow.

15. *Polystichum parvulum* Christ, Bull. Geogr. Bot. Man. 114, (1904) c. fig; Matthew 387, (1911).

Polystichum nanum Christ, Bull. Geogr. Bot. Mans. 238. 1906.
Hemesteum parvulum Lev., 1915.

Rhizomes very short, caespitose, leaves fasciculated, numerous,

stipes scarcely 1 cm. long, covered by minute patent ovate-acuminate brown scales and so as the rachis; fronds 9 cm. long, - cm. broad, lanceolate, linear, obtusish, slightly attenuate towards base, pinnate; pinnae about 23 on each side, closely subimbricate, sessile, rhombic, asymmetrical, subauriculate, lobed only on the anterior side, entire on the lower side, lobes short, 3-5, elongate, arcuato-aristate; sori broad, confluent, brown, 3-4 to a~~p~~ pinna, induciumm inconspicuous; texture squaroso-papyraceous, color light green.

Habit of Asplenium viridum Huds.

Kweichow, Szechwan.

Closely allied to P. hecatopterum Diels, differs in smaller size; stipes 1-3 cm. long, lamina dark-green, rarely 10 cm. long by 1-2 cm. broad, pinnae very close with about 4 deltoid long-aristate teeth on the upper, 3 on the lower edge. *P. nanum* Christ is a dwarfy form with less aristate teeth.

16. *Polystichum dielsii* Christ, Bull. Geogr. Bot. Man. 238, (1906)

Hemesteum dielsii Lev., 1915.
Hemesteum pinfaense Lev., 1915.

Rhizomes short, erect, radicose, like stipes clothed with nuerous scales, which are over ½ cm. long, lanceolate-acuminate, black-fusous; rachis sparcely clad in similar but smaller scales; glabrous in other parts; stipes fasciculate about 5, slender, rufo-stramineous, 9 cm. long; fronds 28 cm. long, 2 cm. broad, linear-lanceolate, acuminate, base scarcely attenuate with lowest pinnae deflexed, simply pinnate; pinnae numerous, about 60 on each side, pectinato-imbricate, erect patent, 1 cm. long, ½ cm. broad, sessile, rhomboidal-obtuse, strongly unequal, cuneate, on the lower side at base acutely and rectangular-auriculate on the upper, minutely serrulato-crenate, teethed, veins flabellato-pinnate, forked; sori 7-8 placed on lateral anterior veins, almost marginal, small, brown; inducium peltate, gray, evanescent; texture thin herbaceous, color light green.

Kweichow.

17. *Polystichum lacerum* Christ, Bot. Gaz. 51. 352, (1911).

Rhizomes short, clad in brown lanceolate-acuminate fimbriato-ciliate scales 3 mm. long; leaves caespitoso-fasciculate, numerous (12); stipes short, 3-4 cm. long, stramineous, densely clad like the rachis in similar and setulous scales; lamina 12-15 cm. long, 22 cm. broad, lanceolate, acuminate, shortly caudate towards the apex, which is terminated by a small usually abortive gemma, scarcely angustate
(P. 84).
towards the base, simple pinnate with lowest pinnae cut deeply or almost down to the costa at base, pinnae 25 on each side, patent, subopposite in the lower ones, sessile, 1 cm. long,

1.5 cm. broad at base, cuneato-ovate, falcate, acute; base unequal, i. e. strongly auricled on the upper side at base, deeply lobed into about 5 lobes on each side, ovate-obtuse, rarely crenulate; sori large, mostly uniseriate, insertedon the anterior margin, brown, contiguous or subconfluent, inducium 0.5 mm. broad, with lacerate margin, at last evanescent. Texture herbaceous, calvous, obscurely green on the upper side hirsute and pale green beneath.

Yunnan - Moupine.

A closed allied member of the Group of Polystichum craspedosorum (Maxim.) Diels, of the same habit, but differs in more scaly and deeply incised pinnae and more delicate and fringed inducium.

A small form of P. craspedosorum Diels.

18. Polystichum lonchitis (L.) Roth. Rom. Mag. 21. 106, (1799); Tent. Fl. Germ. 3. 71, (1800); Bernh. Schrad. Journ. 1799^{1}. 307; KPFL. 190.

Polypodium lonchitis L., 1753.
Aspidium lonchitis Sw., 1801, Mett. n. 92; HKBK. 250; Christ 256.
Dryopteris lonchitis O. Ktze, 1891.
Stipes densely tufted, 2.5-10 cm. long, ebeneous and clothed with large lanceolate pale-brown scales at the base; frond 30-45 cm. long, 2.5-5 cm. broad, pinnate throughout; pinnae 1.2-2.5 cm. long, 6-9 mm. broad, oblong-lanceolate to rhomboidal at base, subfalcate, the two sides unequal, the point mucronate, the margin spinulososerrated, the uppersiде sharpely auricled at the base, the lower obliquely truncate; rachis nearly naked; texture coriaceous; sori usually in two rows.

North Europe, North America, Turkestan, Himalaya, China:

19. Polystichum blinii Lev. et C. Chr. Cat. Pl. Yunnan. 110, (1916).

Aspidium blinii Leveille, Fl. Kouy-tschou 456, 1915.

Rachis flexuose, naked, with sublenticellate base, almost naked, as long as the frond; fronds pinnate, pinnae somewhat falcate, acuminate, margin crenate, crenus denticulate, base cuneate, petiolate; sori placed between margin and costa, quite remote, medial, uniseriate or biseriate on the upper base.

Kweichow: Pin-fa.

20. Polystichum obliquum (Don.) Moore, Ind. 87, (1858); KPFL. 191; Matthew 387, (1911).

Aspidium obliquum Don, Prod. Fl. Napel. 3, 1828.

Aspidium caespitosum Wall., 1825.
Polystichum caespitosum Schott., Bedd., Ferns. Brit. Ind. t. XXXIII.
Aspidium auriculatum HK., HKBK. 493.
Hemesteum obliquum Lev., 1915.

Rhizomes short, thick, the scales ferruginous, ovate, often ciliate; stipes tufted, slender, 5-20 cm. long, stramineous as well as the rachis; fronds 10-25 cm. long or longer, oblong or linear-lanceolate, rather acute, simply pinnate; pinnae rather distant, horizontal, rhomboidal-oblong, 1½-3½ cm. long, obtuse or acute, sharpely but scarcely mucronato-serrate, upper base truncate or obscurely auricled, the lower cuneate; texture chartaceo-membranaceous, surfaces naked, veins forked, the lowest anterior pinnate in the auricle. Sori in 1 row
(P. 86).
on each side of the costa, medial or nearer the edge than the costae, inducium peltate, ciliate or toothed, at length deciduous.

N. India, Formosa, China: Yunnan, Szechwan, Kweichow.

Differs from P. auriculatum by dwarf stature (seldom above 15 cm. high), shorter and broader, pinnae, narrowed more suddenly to an often bluntish point and more bluntly toothed margin.

21. Polystichum auriculatum (L.) Presl. Tent. 83, (1836); Matthew 385, (1911).

Polypodium auriculatum L., 1753.
Aspidium auriculatum Sw., 1801, Mett. n. 90; HKBK. 251 (pt.); Christ 237.
Nephrodium auriculatum Rich., 1836.
Dryopteris auriculatum O. Ktze., 1891.

Stipes tufted, 10-15 cm. long, scaly below or throughout; fronds 30-45 cm. long, 5-10 cm. broad; pinnae numerous, subsessile, usually close, 2.5-3.7 cm. long, 9-12 cm. broad; pinnae nuermous, subsessile, usually close, 2.5-3.7 cm. long, 9-12 mm. broad, ovate-rhomboidal-falcate, the point acute, the edge spinoso-serrated, not lobed, the upper one with a prominent auricle, the lower one truncate in a horizontal line at the base; texture subcoriaceous; rachis stramineous, slightly scaly; lower veinlets in groups of three; sori in two rows one on each side of the midrib.

Throughout India, Ceylon, Himalayas, Formosa, China: Szechwan, Hupeh, Kwangsi, Anhwei.

22. Polystichum lanceolatum (Baker) Diels, Engl. Jahrb. 29, 193, (1900); Matthew 386, (1911).

Aspidium lanceolatum Baker, Gard. Chr. n. s. 14. 494, 1880.

Paleae basal only, small, dark brown, lanceolate; stem tufted, pale green, naked, slender, under 2.5 cm. long; fronds lanceolate, simple pinnate, 5-7.5 cm. long, 8-1.2 cm. broad, firm in texture, glabrous, rather shining; pinnae 15-25-jugate, close, obscurely petioled, quadrangular, entire on the lower and inner side, the latter parallel with the rachis, with 4-5 relatively large deltoid-cuspidate teeth on the upper margin, which is not auricled at the base and about 3 similar teeth on the outer margin; veins flabellate from the lower inner conrer of the pinnae, one veinlet running up to each tooth; sori medial on the veins, 2-4 to a pinnae; inducium small, glabrous.

A small species.

Hupeh: Ichang Gorge.

23. Polystichum atkinsoni (Clarke) Bedd. Ferns. Br. Ind. Suppl. 14, t. 362. (1876); Matthew 385, (1911).

Aspidium atkinsoni Clarke., 1880.

Rhizomes small, scaly; stipes 5-7.5 cm. long, thin, stramineous and with the rachis furnished with a few chaffy scales; fronds 2.5-7.5 cm. long, 1.2 cm. broad, pinnate, the lower pinnae not reduced; pinnae ovate, very coriaceous, spinosely-serrated, the superior base often with an auricle; sori 1-3 to a pinna, generally on the upper half only.

N. India, China: Szechwan, Hupeh.

(P. 86).
24. Polystichum gracilipes C. Chr. Bot. Gaz. 56. 4, (1913).

A smaller plant than Polystichum deltodon (Baker) Diels, with erect rhizomes, sparcely clad in narrow, tawny scales. Stipes fascicled, slender, to 6 cm. long, scarcely 1 mm. across, stramineous, clothed with small ovate-acuminate shortly imbricate scales towards the base, the scales rounded on the upper part. Frond lanceolate, simple pinnate, 10-15 cm. long, scarcely 2 cm. broad, pale green below, subcoriaceous; rachis slender provided with small ovate-lanceolate long acuminate, fimbricate deciduous scales. Pinnae 20-25, close, shortly petiolulated, quadrangular, 8-10 mm. long, 4-5 mm. broad, the lower base cuneat, the upper auriculate, margin toothed, the teeth cuspidate; the lower pinnae slightly smaller and covered with minute scattered scales on the under surface. Sori placed between the margin and costa, or more often closer to the costa; inducium large, persistent, smooth and subentire.

Shensi: Tai-pei Shan.

Closely related to Polystichum lanceolatum (Baker) Diels, from which it differs in longer stipes, scaly rachis, auricled on anterior side at base of the pinnae, and large, persistent

sori. Each pinna bears about 5 cuspidate teeth on the margin.

25. Polystichum deltodon (Baker) Diels in Nat. Pfl. Fam. 1. 4. 191; C. Chr. Ind. 580 (1905); Matthew in Journ. Linn. Soc. 39: 385 (1911).

Aspidium deltodon Baker, Gard. Chron. n. s. 14: 494 (188).
Hemesteum deltodon Lev., Flore du Kouy-tscheou 496 (1915).

Rhizome short, erect, scales sparse, small, dark brown, lanceolate, acuminate, membranaceous, basal, rarely extending higher up; stipes tufted (5-10) together), 5-15 cm. long, slender, naked, stramineous; frond linear, elongate, simply pinnate, 10-20 cm. long, 2.5 cm. broad, scarcely narrowed downward, glabrous, moderately firm in texture; rachis subglabrous with a few small adpressed deltoid dark brown scales; pinnae close, sessile, 20-25 on each side, quadrate-ovate, cut straight on the inner side and strongly auricled on the upper, apex rounded, cuspidate, denticulate on the upper edge, usually entire on the lower; veins inconspicuous, pinnate, veinlets once forked; sori supramedial, small, dark brown, usually confined to the outer half of the pinnae, 3-6 to a pinna, inducium small, glabrous.

Distribution: Szechwan, Yunnan, Hupeh and also Formosa.

This fern was first collected by Marie in Ichang Gorge, about 20 li to the west of the city of Ichang, Hupeh. It is closely related to P. auriculatum Presl. differs only by short deltoid pinnae with few short rather stout teeth.

Var. submarginale (Baker) C. Chr. Medd. Got. Bot. Tradg. I. 67, (1924).

Aspidium auriculatum var. submarginale Baker, Job. XXVI. 227, (1888).

Larger than the type, stipe 10-12 cm. long, lamina 25 cm. long, not or very slightly narrowed below; pinnae 2 cm. long by 0.5 cm. broad, the lower ~~d~~edge straight, the apex obtuse, toothed; about 6 rather short teeth on the lower edge below the tip; color light green, scales few; sori supramedial or submarginal near the tips of the pinnae.

Szechwan, Kweichow, Kwangtung.

(P. 87).
Var. marginale (Christ) C. Chr. Medd. Got. Bot. Tradg. I. 67. (1924).

Polystichum hecatopterum var. marginale Christ., Bull. Geogr. Bot. Man. 1904, 144 cum fig.
Polystichum pinnfaense Christ, 1906.
Polystichum dielsii Christ, 1906, C. Chr. Ind. Suppl. 64, 1913.

Resembles the type in size, but color dark-green, scales of rachis fewer, teeth nearly or quite obsolete; sori supramedial or submarginal; lamina more or less narrowed towards the base.

Kweichow, Szechwan, Yunnan.

26. *Polystichum diplazioides* Christ, Bull. Geogr. Bot. Man. 260, (1902); Matthew 385, (1911).

Rhizomes strong, oblique; stipes fasciculate (3 together), slender, 10 cm. long, firm, dark-stramineous and like rachis clothed in subulato-linear scales 5-6 mm. long; frond deltoid-elongate, 20 cm. long, 10 cm. broad, pinnate, with the lowest pinnae equally long or slightly longer than the upper ones with interspaces 3-1 cm. apart, the upper ones close under the acuminate pinnatifid apex; pinnae 12 on each side, patent, petiolulated, falcato-lanceolate, acuminate, base broader, almost equal and cordate; margin crenate into not prominent, obtuse, rounded lobes ½- cm. broad and only dentate in the apex of pinnae; base of the lowest pinnae deeply lobed downward, not aristate, texture coriaceous, color ochraceous-green, both surfaces glabrous, opaque; veins oblique, pinnate in lobes; sori uniseriate, medial 6-8, remote, rounded, brown, inducium peltate, brown, small.

Kweichow.

27. *Polystichum lachenense* Bedd. Ferns Br. Ind. t. 32, (1866); NPFL. 191; Matthew 386, (1911).

Aspidium lachenense Hooker Sp. 4. 8 t. 212, 1862; HKBK. 250.
Dryopteris lachenense O. Ktze, 1891.

Stipes densely tufted, 5-10 cm. long, stout, ebeneous and clothed with large lanceolate scales below; fronds 10-12 cm. long, 1.2-1.8 cm. broad, pinnate throughout; pinnae 6-9 mm. long, 4-6 mm. broad, oste-deltoid, the two sides equal, the point bluntish, the edge crenate-serrate, scarcely spinulose, bluntly lobed below halfway down; texture coriaceous; rachis stramineous, fibrillose; sori often covering the whole under side of the pinnae, inducium incised.

Sikkim, Himalayas, China: Tibet, Shensi, Szechwan.

28. *Polystichum lobatum* (Huds.) Presl. Tent. 83, (1836); NPFL. 191; Matthew 387, (1911).

Polypodium lobatum Huds, Fl. Angl. 459, 1762.
Aspidium lobatum Sw., 1801; Mett. n. 105; Christ 238.
Aspidium aculeatum part. auctt. HKBK. 352.
Polystichum aculeatum Roth., 1799.
Polystichum aculeatum Sw. var. lobatum Clarke, Ferns N. Ind. 509, 1880.

Differs from Polystichum aculeatum in fronds narrowly lanceolate by the shortening of the lower pinnae, pinnae hardly pinnate, the lower pinnules sessile or decurrent along the secondary rachis; texture sturdy, hard-leathery and evergreen throughout winter; teeth prickly aristate; sori confluent.

Africa, Europe, North America, India, Japan, China: Hupeh, Szechwan.

29. Polystichum otophorum (Franch) Bedd. Handb. Suppl. 42, (1892).

Aspidium otophorum Franch., Pl. David II, 154.

Rhizome short, thick, densely clothed in ovate-lanceolate, fuscous opaque pointed scales; stipes pale stramineous, 7.5-10 cm. long, upper part grooved, clothed with linear-subulate, brown paleae, rachis black near base clothed in large dense ovate-subulate paleae; frond linear-lanceolate 2.5-3.7 cm. broad, firmly papyraceous, pale green, lower part not or scarcely reduced, 12-30 cm. long, pinnate; pinnae numerous (to 40) on on each side, close, clothed with very narrow scales on the lower side, shortly but distinctly petiolate, lanceolate, obtuse, mucronulate at apex, except 1-3 basal lobes which are subentire, the others obscurely crenato-denticulate, teeth mucronulate, on the upper side a free erect obliquely ovate basal lobe is present and sometimes 1-2 smaller ones on the lower side, veins pinnate, tertial veins furcated; sori small all in continuous line neath the margin; indusium coriaceous, peltate, margin entire, soon deciduous.

Yunnan - Moupine; Szechwan.

Near P. hecatopterum, but the lower pinnae with a free auricle or pinnule and scales of the rachis from a thin, light-brown, densely fringed, ovate or circular base suddenly contracted into a lanceolate subulate, firm, castaneous apex.

30. Polystichum bonatianum Brause, Hedwigia 54. 200. t. 4. B. (1914).

Rhizome and stipes not seen. Lamina 38 cm. long, 24 cm. broad subdeltoid with pinnatifidal, acuminate apex, scarcely narrowed towards base, pinnate to pinnatifid, texture papery, glabrous on both sides, cinnamommonum brown upon drying. Pinnae 13-15-jugated, alternate, subapproximate, the lower ones bi-jugated, slightly remoter, the upper ones adnate, crenate, the uppermost ones sessile, pinnatifid almost down to the costa, all linear-lanceolate in outline, slightly enlarged at base, obtusish at the apex, falcato-patent; the lower ones much the largest, 14 cm. long, 4 cm. broad at base, the segments subrhombic, contiguous, basal wing 1-3 mm. broad, confluent, separated by narrow acute sinuses, entire on the lower part, but subrounded, toothed towards the apex,

the largest 2.2 cm. long, 1.3 cm. broad; veins numberous, pinnatifid, mostly furcate, the margin scarcely touched each other, rachis and costa glabrescent, paleae sparce, pale when young, lanceolate, 2-3 mm. long. Sori few, irregularly placed, large, mostly on the base of the segment, uniserial on each side of the costa, indusium peltate, membraneous; spores billateral winged and crested, black, pellucid.

Yunnan: Ma-hong.

This species bears no resemblance to any of the known species of the genus. Without seeing the round and peltate indusium, one would consider it as one of the genus Dryopteris.

31. Polystichum leveillei C. Chr. Bull. Geogr. Bot. Man. 145, (1913).

Species much smaller than the slender Polystichum caespitosum (Wall.); rhizomes small, suberect, almost naked; stipes tufted, to 10 cm. long, gracile, glabrous, covered near base with few small ovate entire scales. Lemina lanceolate, 7-15 cm. long, 2-3 cm. broad, papyraceous, very glabrous, pinnate or in larger plant bipinnate; pinnae 10-15-jugate, distant, shortly petiolate, 1-2- cm. long, 4-8 mm. broad, cuneate on the lower base, truncate on the upper, apex obtuse, lobated and shortly serrate (teeth acute, short, not mucronate,), acute or in larger leaves subpinnate into 2-3 lateral pinnules or often only with free auricle on the superior base; pinnae or segments obovate,
(P. 89).
marging repandula or very shortly serrate; veins obscure; sori small, much nearer to the margin; indusium not seen.

32. Polystichum tripteron (Kze.) Presl. Epim. 55; NPL. 191; Matthew 388. (1911).

Aspidium tripteron Kze., Bot. Zeit. 569, (1848); Mett. n. 118; HkBk. 254; Christ. 237.
Aspidium tripteris Eaton, 1856.

Stipes 15-23 cm. long, densely clothed at the base with large ovate dark-brown scales; fronds 30-45 cm. long, with a large ovate terminal and two small spreading lateral pinnae at the base of it, the former 6.5-7.5 cm. broad, with very numerous spreading pinnules on each side, 3.7 cm. long, 9-12 mm. broad, very unequal-sided, the ~~pint~~ point acute, the edge deeply inciso-pinnatifid, the lower lobes again toothed, the upper side abruptly narrowed and the lower obliquely truncate at the base; lateral pinnae 7.5-12 cm. long, 3.7-5 cm. broad, with numerous similar pinnules; texture herbaceous; rachis nearly naked, stramineous; sori principally in two rows midway between midrib and edge.

Japan, Tsus-sima, China: Manshuria, Szechwan, Hupeh, Anhwei.

Recently collected in Hwang-shan, S. Anhwei by the author.

33. *Polystichum chunii* Ching in Sinensia 1: 2 (1929).

Rhizome thick strong, woody, rather short oblique ascending; scales large, dense, imbricate, membranaceous, ferrugineous, broad ovate, long acuminate, 6-10 mm. long, 3-5 mm. broad; stipes fasciculate, 5-10 clustered, 8-12 cm. long, 2 mm. thick, rufostramineous, densely clad in dimorphic scales, the one similar to the rhizomatic paleae, the other, smaller, fibrillose-subulate or linear-subulate, extending throughout the rachis; fronds linear-lanceolate, 35-42 cm. long (including stipes, 9-11 cm. long) 4.2-5 cm. broad, bipinnate, abbreviate towards base, long attenuate towards apex, gemmiferous and radicant at tips of a considerable distance backward; gemmae globular, densely clad with imbricate scales similar to the rhizomatic ones; pinnae subsessile, alternate or sub-opposite, rather confert, horizontally patent, with the lower ones deflexed, numerous, 30-35 on each side of the rachis, glabrous above, fibrillose beneath, clad at the point of insertion beneath with a few ovate, acuminate, ciliate scales, 2-2.5 cm. long, 1 cm. broad at base, oblong-lanceolate, pinnate (except the terminal ones which are only aristate crenate or serrate) below the middle, pinnatifid towards apex, strongly auricled on the anterior side; i. e., the basal pinnule on the upper side of the costa much the largest with its inner side cut parallel to the rachis and aristato-acute apex; pinnules 5-7 confert, basal ones free, sessile, upper ones adnate, rhomboidal-ovate, entire or crenate, rounded and aristate at apex; texture thick, coriaceous, shining green above, pale below; veins inconspicuous, lateral veinlets in the pinnules 3-5-jugate free, mostly once-forked; sori small, uniserial, 2-3 on each side of the costule, medial, dorsal on the veinlets, indusium small, coriaceous, persistent.

Kwangsi.

34. *Polystichum acanthophyllum* (Franch.) Christ in Bull. soc.
Bot. Fr. 52: Mem. I. 30 (1905); C. Chr. Ind. 575 (1906);
Matthew in Journ.
(P. 90).
Linn. Soc. 39: 384. (1901).

Aspidium acanthophyllum Franch., Bull. Soc. Bot. Fr. 32: 28 (1885).

Polystichum aculeatum Schott. var. acanthophyllum Bedd., Handb. Suppl. 43 (1892).

Caudex short, erect; stipes fasciculate, 3-8 cm. long, stramineous, angular, densely paleaceous, paleae yellow, concolored, dimorphic, the one narrow, linear, the other broadly

ovate, abruptly cuspidate, sparingly imbricate; frond narrowly lanceolate, acuminate, slightly reduced downward, 10-20 cm. long including the stipe, scarcely 2.5 cm. broad, bipinnatifid or bipinnate below under the pinnatifid apex, rachis densely scaly, scales yellow, linear-setaceous; pinnae subsessile, close, imbricate, somewhat distant below, texture rigidly coriaceous, lustrous green above, pale below, glabrous, ovate-lanceolate, or oblong, 6-8 mm. broad at the base, which is pinnati-lobated; lobes ovate, 2-4 on each side, cut straight on the inner side and parallel to the rachis, margin thickened, strongly revolute, apex rigidly spinescent; sori uniseriate, dorsal on lateral veinlets, closer to the costa of pinnae or costules on basal pinnules or lobes, dark brown, indusium peltate, orbicular, margin slightly erosed.

Yunnan, Szechwan.

Habit of P. aculeatum Schott. but of much smaller size, thick coriaceous texture and simpler pinna. Evidently an alpine plant of xerophytic habit. A fairly common fern in Yunnan and Szechwan, as it has been reported by many a collector from that region since its discovery by Delavay in 1882.

Var. *ilicifolium* (Don) C. Chr. Medd. Got. Bot. Tradg. 1. 69, (1924).

Polystichum ilicifolium Moore, Ind. 94, (1858); Bedd. Handb. 206. f. 103; Matthew 386, (1911).
Aspidium ilicifolium Don, n. Prod. Fl. Nepal. 3, 1852 HKBr. 251; Christ. 238.
Polystichum ilicifolium var. delavayi Christ, Bull. Soc. Fr. 52 Mem. I: 31. 1905.
Polystichum stimulans Presl., 1836.
Aspidium stimulans Kze.; Mett. n. 97, 1858.

Stipes densely tufted, 5-10 cm. long, slender, clothed with large scales throughout; fronds 15-25 cm. long, 2.5-5 cm. broad; pinnae subdeltoid or triangular, 1.2-2.5 cm. long, the apex mucronate, cut down below to the rachis into lanceolate or ovate-mucronate lobes; texture coriaceous; both surfaces naked; rachis slender, fibrillose; veins immersed; sori principally in two rows near the midrib, indusium peltate.

India, China: Yunnan, Szechwan.

Between the small P. ilicifolium (Don) and the larger P. acanthophyllum several inetrmediate forms occur.

35. *Plystichum capillipes* (Baker) Diels, NPFL. 191, (1899); Matthew 385, (1911).

Aspidium capillipes Baker, Job. XXVI, 228, (1888).
Polystichum minusculum Christ, Bull. 50 c. Fr. 52 Mem. 1. 31. 1905.

Stipes densely tufted, thread-like, naked, 7.5-10 cm. long; basal paleae lanceolate, brown, membranous; lamina lanceolate, 5-7.5 cm. long, not more than 1.2 cm. broad, deeply bipinnatifid, moderately firm in texture, green, glabrous, with many minute linear dark brown paleae on the main rachis; pinnae lanceolate, 6 mm. long, most of the pinnules
(P. 91).
lanceolate-aristate and 1-nerved, but the lowest on the upper side much larger than the rest and deeply pinnatifid; sori one to a pinnule, indusium large, convex, persistent, membranous.

Yunnan, Szechwan - Omei Shan.

36. Polystichum braunii (Spenn.) Fee, Gen. 275, 1850-52; MFL. 192.

Aspidium braunii Spenn. Fl. Friburg. I. 9, t. 2. 1825. Mett. n. 109; Christ 238.
Dryopteris braunii Underw., 1896.
Polystichum haleakalense Brack., 1854.
Polystichum braunii var. clarkei Christ, Bull. Boiss. VII. 15. 1899.

Scales thin, pale brown. Leaves attenuated towards the base, stipes very short; frond bipinnate, texture herbaceous; pinnules round-ovate, slightly auricled, adnate, bluntly toothed which are softly bristled. Sori few, large, blackish, often one on the upper segment, not confluent.

India, China: Yunnan, Szechwan, Shensi.

37. Polystichum woodsioides Christ, Bot. Gaz. 51. 354, (1911).

Rhizomes short, clad in entire ovate brown-scariose scales 3 mm. long; leaves fasciculate-caespitose, numerous (10), stipes strong, 1.5 mm. thick, 6 cm. long, flavo-stramineous, darkbrown towards base, clad in scariose light-brown ovate acute entire scales, intermingled with narrower and short hairs, rachis thick, pubescent with pale setules; fronds 15 cm. long, 23 mm. broad, linear-lanceolate, acuminate, narrowed towards base, bipinnatifid; pinnae confert, the lower ones more remote and strongly diminuate, about 27 on each side, almostly sessile, deltoid-oblong, broadest at base, obtusely attenuate towards apex, 1 cm. long, 0.5 cm. broad at base, deeply incised down to the costa towards base, segments about 5 on each side, imbricate, confert, the lowest ones free, the superior ones connate at base, ovate, acutish, minutely dentate, pubescent beneath, naked above; sori placed on the upper part of the tertiary segments, numerous, 3 or 4 to a lobe, rounded, continuous and confluent, brown; indusium peltate, corrugated, persistent, brown, minute, with black umbel; texture softly herbaceous, obscure above, pale green below.

Yunnan - Loupine

Remarkable for its very narrow fronds with very small but much incised pinnae and thick rachis.

38. Plystichum molliculum Christ, Bot. Gaz. 51. 354, (1911);
C. Chr. in Medd. Got. Bot. Tradg. I. 65, (1924).

A small species, leaves flaccid, multifibrillose, subpinnate. Rhizome erect, thick, clothed with reddish, lanceolate, fimbriate-ciliate, dense scales. Leaves mostly fasciculated, stipes short, to 2-3 cm. long; rachis scaly, fibrillose at base with broader, densely fimbriate, linear-subulate slender, pale-brown, scales. Lamina attenuate, to 10 cm. long, 1.2 cm. broad in the middle, softly herbaceous, subpinnate, the upper surface sparcely and undersurface densely provided with fibrillose filiform scales. Pinnae alternate, shortly petiolulate, the lower ones gradually abbreviated, the middle ones about 1.5 cm. long, 0.5 cm. broad, base unequa; the anterior side truncate the posterior exciso-cuneate, pinnate near the base almost down to the costa, pinnatifid upward. Pinnules or segments 4-5 on each side, the basal ones free, the anterior ones much the largest, sublobulate, the upper ones oblique, decurrent, with denate
(P. 92).
apex, teeth 3-5, acute or often obtuse. Sori 1-2 to each segment; indusium quite large, peltate, whitish when young, very thin, reddish sericeous, margin long piloso-fimbricate.

North Szechwan: Sung-pan; Hupeh, Chihli.

This spe/cies connects the group Crasped/osorum with that of P. precottianum and yet can be d/istinguished from all smaller forms of that species (var. moupinense and var. shensiense) by the fimbriate scales without large pale ones intermixed and by the more densely fibrillose underside.

39. Polystichum prescottianum (Wall.) Moore, Ind. 101, (1856);
Matthew 387, (1911).

Aspidium prescottianum Wall., 1828; Mett. Pheg. u. Asp. 48. n. 110, 1858; HKBK. 253.
Dryopteris prescottianum O. Ktze., 1891.

Stipes tufted, 2.5-10 cm. long, clothed with large lanceolate pale-brown scales; fronds 30-45 cm. long, 5-7.5 cm. broad, narrowly ovate-lanceolate, with nuerous spreading pinnae, 2.5-3.7 cm. long, 1.2-1.6 cm. broad, cut down to the rachis into several oblong-rhomboidal pinnules with aristate teeth; texture subcoriaceous; rachis weak, stramineous, densely scaly throughout, veins immersed; sori filling the whole breadth between edge and midrib.

Himalayas, China: Szechwan, Shensi, Yunnan.

To this species Christensen has referred a number of forms, which Christ has described as species, which all agree with the Himalayan type, though vary considerably in partition.

Var. *moupinense* (Franch.) C. Chr. Medd. Got. Bot. Tradg. I. 70, (1924).

Polystichum moupinense Franch., Pl. David. II. 153; Bedd. Handb. Suppl. 42, 1892.
Polystichum lichiangense Wright
Leaves long, narrow, scarcely 3 cm. broad, bipinnatifid, pinnae close, rachis thick.
Yunnan, Szechwan, Kansu, Shensi.

Var. *wilsoni* (Christ) C. Chr. Medd. Got. Bot. Tradg. I. 71, (1924).

Polystichum wilsoni Christ, Bot. Gaz. 51. 356, 1911.
Leaf much larger (6-12 cm. broad), fully bipinnate with distantly set pinnules; comes near to *P. braunii*

Var. *sinense* Christ, Bull. Soc. Bot. Ital. 289, (1901); C. Chr. Medd. Got. Bot. Tradg. I. 71, (1924).

Polystichum sinense Christ, Bull. Soc. Fr. 52. Mém. I. 36, 1905.

Rhizomes suberect, leaves fasciculated, stipes 5 cm. long, stramineous, dark fuscous at base and with rachis densely clad in dimorphic scales. Lamina nearly or fully bipinnate, 25 cm. long, 2.5 cm. broad, linear lanceolate, strongly attenuate towards the base with basal pinnae reduced into mere auricles, apex strongly acuminate; pinnae nuerous, 25-35 on each side of the rachis, distant, broader from the base, oblong acuminate, sub-unequal, 1.5 cm. long, 7 mm. broad, pinnate; pinnules 5 or 4 on each side of the costa, adnate, ovate acute, irregularly and acutely incised into finely aristate teeth at apex; texture flaccid herbaceous; sori large, castaneous, 3 or 2 on each side of the costule, indusium subpeltate, membranaceous, large.

(P. 95).
Shensi, Szechwan.

Leaf shorter and broader than in var. moupinenese, nearly or fully bipinnate; comes very near to the genuine P. prescottianum and exactly intermediate between var. moupinense and var. *wilsoni*

Var. *shensiense* (Christ) C. Chr. Medd. Got. Bot. Tradg. I. 71, (1924).
Polystichum shensiense Christ, Bull. Geogr. Bot. Man. 113, (1906); Matthew 387, (1911).
Like the preceding variety but rachis slender, leaf flaccid. teeth not aristate.

Shensi, Szechwan.

This variety comes very near to P. thomsoni (HK.) Bedd.

Var. *sinense* Christ, Bull. Soc. Bot. Ital. 289, (1901); C. Chr. Medd. Got. Bot. Tradg. I. 71, 1924.

Polystichum sinense Christ, Bull. Soc. Fr. 52. Mem. I. 30, 1905.

Leaf shorter and broader than in var. *moupinense*, nearly or fully bipinnate, comes very near to the genuine P. prescottianum and is exactly intermediate between var. *moupinense* and the following

Szechwan.

40. *Polystichum tsus-simense* J. Sm., Hist. Fil. 219, (1875); Ferns. 181.

Polystichum lobatum var. tsus-simense C. Chr., Ind. 583, (1906).
Aspidium aculeatum Schott. var. lobatum Bak.
Aspidium aculeatum Schott. var. pallescens Franch.
Aspidium tsus-simense Hooker, Sp. 4. 16 t. 220, 1862.

Caudex short thic, oblique, crowned with large black lanceolate-subulate falcate black scales; stipes tufted, slender, a span long, stramineous, at the base scaly with the same black scales as the caudex mixed with slenderer subulate ones and black hairs; fronds a span to 30 cm. long, finely acuminate chartaceous, bipinnate, pinnate above, pinnae 2½-3½ cm. long shortly petiolate, from a broad base gradually acuminate, -falcate, superior side of the base truncate and forming a large spinulose-pointed auricle; pinnules very compact, ovate, spinulose at the apex, entire or with very minute mucronate serratures, ultimate ones confluent; superior pinnae simple, lobato-pinnatifid, the lobes spinulose, ultimate ones confluent into a long attenuated apex, lower pairs of pinnae scarcely smaller than the rest, reflexed, sori 2-4-6. on each side the costule; inducium thin membranaceous, orbicular and flat, on maturity recurved like a cup with a large raised black centre.

Tsus-Sima, Japan, China: Chili, Szechwan, Anhwei, Chekiang T'ien-moo Shan; Hupeh - Wu-shan; Shensi, Kweichow, Yunnan.

Differs from P. aculeatum by smaller size, shining black setaceous paleae on the rachis, almost imbricate rhomboidal-ovate entire pinnules, which are not or only slightly (except the basal ones) auricled and entirely glabrous beneath and long acuminate pinnatifid apex of the pinnae.

41. Polystichum yunnanense Christ, Not. Syst. I. 34, (1909)
Matthew 388, (1911).

Rhizomes coarse, oblique, covered with reddish-brown setae 5 mm. long; stipes 30 cm. long; thick as swan's cuill, stramineous, like rachis covered copiously with etaceous and subulate crisp reddish scales 4 mm. long, towards base with adpressed broad-ovate, acute, scareous brown scales 6-8 mm. long; fronds 40 cm. long, 20 cm. broad,
(P. 94).
slightly narrowed towards base, oblong, acuminate, bipinnate; pinnae about 25 on each side with interspace 2-4 cm. wide sessile (or rather subsessile), base slightly dilated, acuminate, 15 cm. long, 3 cm. broad; pinnules pactinato-confert, rhomboidal-triangular, about 18 on each side, distinctly petiolulate, unequal, aristulate, the lower ones with much broadened base, lobed to a narrow wing, lobes 3-4, ovato-rounded, sori medial, 5-7 on each side, the lower ones often biserriate, 1.5 mm. broad, contiguous, reddish-brown; indusium peltate, conspicuous, persistent, gray; glabrous on both surfaces or subfurfuraceous, scaly along the costa; texture herbaceous, scarcely subcoriaceous, color light green.

Himalaya, Yunnan.

42. Polystichum longipaleatum Christ, Not. Syst. I. 35, (1909); Matthew 387, (1911).

Rhizomes clad at apex in very dense and beautiful filiform spreading, aureo-ochraceis setae similar to those in Cibotium barometz or Dryopteris crenata; stipes 17 cm. long, slender, clothed with crisp pale-brown setules and also slightly ovate, diaphanous scales 5 mm. long; fronds 35 cm. long, 11 cm. broad, scarcely narrowed twards base, ovate-lanceolate, long acuminate, bipinnate; pinnae confert, about 30 on each side under the apex, 5 cm. long, 1 cm. broad, subsessile anterior base with larger pinnules, sometimes incised, acuminate, pinnate down to rachis on both sides, rachis clad with erect lanceolate acute slender long-aristate, golden-yellow paleae 4 mm. long; pinnules imbricato-confert, inequal the upper side, truncate at base cuneate on the lower, rhombic attenuate into petiolulate, acute, 8 mm. long, 4 mm. broad, aristate-dentate, both sides beset with long very fine sparce golden-yellow setae; sori medial, brown, exindusiate, 3-5, chiefly in the anterior part of the pinnules.

Yunnan, Kweichow.

43. Polystichum cyclolobum C. Chr. in Lev. Cat. Plant. Yunnan III, (1906).

Stipes and even rachis densely clothed with luteo-brown concolored either ovate or linear lacerato-fimbriate paleae. Lamina broader from the base and gradually attenuate into short acuminate apex, 20 cm. long, 5 cm. broad at the base,

texture coriaceous, pale green below, bipinnate. The basal pinnae much the largest, the upper ones gradually smaller, alternate, petiolate, oblong, 2-3 cm. long, 1 cm. broad at the base, aristate at the apex, the inferior ones pinnate, the lower side towards costa and costules provided with ovate-acuminate fimbriate paleae. Pinnules about 5-jugated, 5 the lowest 2 pairs free, the upper ones decurrently confluent, the uppermost part dentato-spinulose. Pinnules or lobes orbicular or ovate-rhomboid, the basal acroscopic ones slightly larger, margin incrassate, apex aristate and usually the anterior margin unidentate. Veins immersed. Sori dark-brown, dense and confluent: indusium glabrous, margin slightly lacerate.

Yunnan.

From P. ilicifolium (Don) Moore, the species differs by orbicular or ovate-rhomboid pinnules and lacerate-fimbriate paleae; from P. acanthophyllum (Franch.) Christ, it differs by lamina being not attenuate towards the base, pinnules 4-5-jugated and paleaceous beneath.

44. Polystichum thomsoni (Hk. fil.) Bedd. Fern. Brit. Ind. t. 216, (1866); NFPL. 191.

Aspidium thomsoni Hk. fil., in Hk. 2 Cent. t. 25, 1860; HKBK. 251.
Dryopteris thomsoni O. Ktze., 1891.
Lastrea gracilis Moore, Bedd. 1866.
Nephrodium sparsum var. gracilis Moore, Bedd. Ferns Brit. Ind. t. 1198; HKBK. 498.

Stipes tufted, 5-10 cm. long, fibrillose; fronds pinnate, linear up to 17 cm. long, subcoriaceous, not gradually attenuated at the base, both surfaces more or less fibrillose; pinnae cut down almost to the rachis, bristlely serrate, very unequal at the base, the lower margin being cut, the upper with the basal lobe% much enlarged; veins pinnate or forked in the segments; sori terminal on a veinlet; indusium peltate, bluntly crenate or subentire.

N. India, China: Szechwan.

Very much near smaller forms of P. prescottianum, but the stipe is fibrillose, not scaly.

45. Polystichum aculeatum (L.) Schott. Gen. Fil. ad t. 9, (1834); NFPL. 191; Matthew 384. (1911).

Polypodium aculeatum L. pt. 1753.
Aspidium aculeatum Sw., 1801, HKBK. 250 (pt.); Christ 237.

Aspidium angulare Kit.; Willd. 1810.

Stipes tufted, 15-30 cm. long, more or less clothed with ovate-lanceolate and fibrillose pale-brown scales; fronds 30-60 cm. long, 20-30 cm. broad, ovate-lanceolate; 2-pinnate, lower pinnae close, not or slightly shortened downward lanceolate, 10-15 cm. long, 1.2-1.8 cm. broad; once pinnate, pinnales confert, distinctly short-stalked, ovate-rhomboidal, unequal-sided, auricled on the upper side at the base; teeth aristate or in some forms deeply cut into free auricled and 3-5 segments cleft down to the costa; texture subcoriaceous; rachis straw-colored, more or less scaly; under surface slightly fibrillose; sori principally in two rows nearer the midrib than the edge.

A very variable species common throughout the world, rare in the arctic regions and N. America, China: Kansu, Kweichow, Yunnan, Anhwei, Kiangsu, Szechwan, Hupeh, Kwantung, Kiangsi, Chekiang.

Var. biaristatum Baker l. c.; Matthew 384, (1911).

Aspidium biaristatum Bl., Enum. 174, 1828.
Polystichum biaristatum Moore, 1858.

Differs from the type by frond narrowed suddenly upward and large rhomboidal pinnules with aristate teeth principally at the apex and auricle.

Malesia, India, China: Szechwan.

Var. pycnopterum Christ, Bull. Boiss. vii, 14, (1899); Matthew 384, (1911).

The segments very closely confert, thus making the pinnae appears hardly divisible; sori confluent, the scales near the base of stipe large, stiff, falcate, black with pale margin, over 2 cm. long, 7 mm. broad.

Yunnan.

(P. 96).
Var. setulosum Ros. Fedde Repert. 13. 129, (1914).

Stipes and rachis covered by ferruginous denticulate paleae, auricles broad-ovate, acuminate, to 1 cm. long, [illegible] cm. broad, densely covered by smaller and narrower, lanceolate or linear wings; pinnules particularly near the margin, clad with piliform paleae 2-2½ mm. long, margin dentately long-aristate. Stipes about 25 cm. long, lamina to 50 cm. long, 12 cm. broad, pinnae and pinnules much confert.

Kweichow; Pin-fa.

Var. veitchii Christ, Bull. Bull. Boiss. ii. 513, (1903).

Differs from the type in pinnules being oblique oval, rounded with very short apex and almost entire margin but the basal pinnules on the anterior side of each pinna are very deeply pinnatifid.

Yunnan.

46. Polystichum nepalense (Spr.) C. Chr. Ind. 585, (1906); Matthew 387, (1911).

Aspidium nepalense Spr. Syst. 4. 97, 1827.
Aspidium marginatum Wall., 1828, Mett. n. 88.
Polystichum marginatum Schott., 1834.
Aspidium auriculatum BKHK., HBBK. 2851.
Aspidium manmeiense Christ, Bull. Boiss. 6. 965, 1898.

Closely related to Polystichum auriculatum, differs in larger oblong or ovate-lanceolate fronds, narrowed at the base, more coriaceous texture; lowest pinnae falcate, often 2-5-pinnate; main and partial rachises nearly naked; tertiary segments oblong, obtuse, serrate or pinnatifid, sometimes nearly down to the costa.

Luson, N. India, China: Yunnan, Szechwan.

A species most distinct by the pale or nearly white short teeth and by the large scales of the rachis, as a rule, one near the base of each pinna.

47. Polystichum squarrosum (Don) Fee var. chinense (Christ) C. Chr. Medd. Got. Bot. Trädg. 1. 69, (1924).

Polystichum lobatum var. chinense Christ.
Polystichum aculeatum var. platylepis Diels, 1900
Aspidium aculeatum var. biarielatum Baker.

With frond 1.5-2 cm. long, 1-1.5 cm. broad, coriaceous; stipes short, amply clothed with paleae.

Japan China: Hupeh, Yunnan, Shansi, Szechwan.

48. Polystichum standishii (Moore) C. Chr. Ind. 587, (1906).

Lastrea standishii Moore, Gard. Chr. 292, 1863.
Aspidium laserpitiifolium Mett., Ann. Lugd. Bat. 1. 227 t. 6. f. 3. 1864; Hask. 254; Christ 240.
Polystichum laserpitiifolium Mett., Ann. Lugd. Bat. 1. 227 t. 6. f. 3. 1864; Hask. 254; Christ 240.
Polystichum laserpitiifolium J. Sm., 1877; [illegible] 195.

Stipes 10 cm. long, stramineous, scaly at the base; fronds 30-45 cm. long, 15-25 cm. broad, ovate-deltoid, tripinnate; lower pinnae the largest, with pinnules on the lower side prolonged, lanceolate, imbricate with small distinct, bluntly,

not deeply lobed segments; texture subcoriaceous; color light-green; both side and rachis glabrous; sori in two rows occupying nearly the whole space between the edge and midrib.

Loochoo, Tonkin, Japan, China: Szechwan, Canton - Lou Fan Shan.

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¶ Differs from Polystichum amabile by being more compound, with smaller, cuneate, oblong, less-toothed segments and larger sori.

49. Polystichum henryi Christ, Bot. Gaz. [illegible] 36. (1909); Matthew 386, (1911).

Rhizomes creeping thick as a man's finger, clothed with abundant lanceolate subulate brown undulate [illegible] scales 5 mm. long; stipes strong, thick as swan's quill clothed with angulose-sulcate spreading, lanceolate, subulate brown scales 7.5 mm. long, borne on verruculae, stramineo-flavous; 55 cm. long; fronds ample, about 80 cm. or more long, broadly deltoid, acuminate, 3-pinnatifid; pinnae about 15 on each side, remote, petiolate, the lower ones with petiole 3-5 cm. long, 3 cm. long, 20 cm. broad at base, deltoid oblong, acuminate; pinnules about 15 on each side, remote, petiolulate, deltoid, elongate-acuminate, the lower ones with base [illegible]7 cm. broad, 17 cm. long, broadened on the upper base; tertiary pinnules confert, auriculately broadened on the anterior base, petiolulate, deltoid, acute, 3.5 cm. long, 2 cm. broad, the upper ones obtuse; the segments imbricate-confert, about 5 on each side, the lower ones 1 cm. long, 5 mm. broad, the upper gradually smaller, obovate, obtuse, inciso-serrate; lobes aristate-dentate, the lower ones sometimes with base free. Sori minute, 0.5 mm. broad, numerous, about 5 to each segment, brown, indusium reniform, soon corrugated and evanescent, dark brown; texture thin papery, color light green, both surfaces naked.

[illegible], China: Yunnan.

50. Polystichum alcicorne (Baker) Diels, Engl. Jahrb. 29. 194, (1900). Matthew 384, (1911).

Polypodium alcicorne Baker, Job. XXVI, 229, (1888).
Aspidium alcicorne Christ, 1901.

Caudex erect, stipes densely tufted, stramineous, 10-17 cm. long, clothed throughout with small ovate-unequal-sized brown paleae; lamina oblong-lanceolate, 3-4-pinnatifid, 20-25 cm. long, about 5 cm. broad, texture firm, green and glabrous; rachis scaly like the stipes; pinnae lanceolate, at most 3.7 cm. long, 1.2 cm. broad, much reduced on the lower side; final segments non-contiguous, lanceolate, aristate, 1-nerved 2-4 mm. long; sori minute, solitary, near the tip of the segments.

Hupeh, Szechwan - Omei Shan.

Nearest to Aspidium foeniculacum Hooker in texture and cutting.

51. Polystichum omeiense C. Chr. Ind. 67, (1905); 585 (1906); Matthew 389, (1911).

Aspidium carvifolium Baker, Job. xxvi. 228.
Polystichum carvifolium Diels., 1900.
Polystichum faberi Christ, Bot. Syst. i. 37, 1909. 1888. (non Aze. 1851.).
Polystichum carvifolium Christ, 1899.

Caudex stout, erect, stipes densely tufted, slender, stramineous, 5-7.5 cm. long, with a few small lanceolate paleae; lamina lanceolate, finely decompound, 23-30 cm. long 3.7 cm. broad, moderately firm in texture, bright green, glabrous; rachis naked, slender, stramineous; pinnae lanceolate, multijugate, 1.8-2.5 cm. long, 6-8 mm. broad, much cut away on the lower side; lower pinnules deltoid, bipinnate; final segments lanceolate-aristate, 1-nerved 1.5-2 mm. long; sori not more than one to each final segment, various in position, inducium small,
(P. 98).
peltate, glabrous.

Yunnan, Szechwan - Omei Shan.

A very distinct and bea~~t~~utiful species, closely resembles Asplenium tenuifolium in habit.

52. Polystichum martini Christ, Bull. Geogr. Bot. Man. xi. 263. (1902); Matthew 387, (1911).

As species very closely allied to Polystichum omeiense C. Chr. but differs in large dimensions in all parts and much less divided bi-pinnate, fronds with 20 pinnae on each side, pinnae bipinnatifid, pinnules with 4 or more lobes, the ultimate lobes 2-3 mm. broad, ovale, pointed, sori 1 mm. across, inducium peltate, 1 mm. across, with a fairly large centre; while the fronds in Polystichum carvifolium has 30 or more pinnae, which are tripinnate, pinnules ½-2/3 mm. broad; sori ½ mm. across, inducium small, centre none or punctiform.

Kweichow.

53. Polystichum wattii (Bedd.) C. Chr. Ind. 589, (1906).

Aspidium wattii Bedd., Job. 234, 1888.
Lastrea wattii Bedd., 1892.

Stipes stramineous, 10-13 cm. long, clothed with a few light-coloured deciduous scales; fronds 30 cm. or more long by 5-6.5 cm. broad, tripinnate, broadest in the centre,

gradually narrowed towards the apex and base; rachis naked; texture subcoriaceous; surfaces glossy; ultimate segments obovate to lanceolate, sharpely acuminate or more rarely with a rounded apex more or less 2-lobed; veins 1-forked in the ultimate segments; sori apical on the short lower veinlets; often furnished with a few deciduous hair-like scales.

N. India, China: Yunnan.

54. *Polystichum bissectum* C. Chr. Ind. Suppl. 64. (1913).

Polystichum omiense Christ, Bull. Geogr. Bot. Man. 114, (1906) (non C. Chr. 1905).

Rhizome thick, short-erect, radicose; leaves fasciculated, stipes slender, stramineous, 15 cm. long and like rachis sparcely covered with lanceolate subulate short dark brown scales, otherwise glabrous; fronds oblong 25 cm. long, 6 cm. broad, acute, base not attenuate, bipinnatifid, pinnae very shortly petiolate, strongly unequal at base, cuneat on the lower side at base, quite auriculate on the upper side, cut down to a narrow wing, falcate-lanceolate pinnules 3½ cm. long, 7 mm. broad at the middle, about 15 on each side, the basal auricle 1 cm. long, 6 mm. broad, free, lobed, lobes 3 on each side, ovate, aristate, 2½ mm. broad, cuneat-oblong, oblique, acute, aristate, auricles 1 or 2 lobed, ovate, aristate, veins hidden, pinnate in auricles, forked in ultimate segments; sori minute, dark brown, placed in teeth of segments, mostly solitary; inducium coriaceous, dark brown, 2/3 mm. broad, peltate; texture coriaceous, color light green.

Szechwan - Omei Shan.

55. *Polystichum bakerianum* (Atkins) Diels, NPFl. 191, (1899); Matthew 385, (1911).

Aspidium bakerianum Atkins. MSS), Baker in HK. Ic. pl. t. 1656, 1886.
Aspidium prescottianum var. bakeriana Clarke, Ferns. n. Ind.
(F. 99).
510 t. 66. f. 8. 1880.
Aspidium microchlamys Christ, 1899.

Caudex erect; stipes elongated, 15 cm. or more long, tufted, paleae large, lanceolate, membraneous, ferrugineous; fronds large, oblong-lanceolate, tripinnatifid, rachis prorsus paleaceous, pinnae multi-jugate, sessile, lanceolate, the lower ones gradually become small, deflexed, pinnules sessile, unequilateral, ovate, argutely pinnatifid at base, the lower side of the base cuneate-truncate, veinspinnate, veinlets ascending; sori medial, inducium membraneous, glabrous.

India, Japan, China: Szechwan.

Differs from P. prescottianum Wall. in fronds being large, broad-lanceolate, truncate at the base, secondary pinnae 2.5 cm. long, pinnatifid.

22. Polybotrya Humboldt et Bonpland, Willd. Sp. 5. 99. (1810).

Type: Polybotrya osmundacea. H. B. Willd.

Sori superficial, massed, non-indusiate, receptacles occupying the whole under surface or both upper and under surfaces of the rachiform convalute, pinnatifid or spiciform fertile segments, veins-simple or forked, or pinnate from a central costa; venules simple or forked, free. Fronds dimorphous, pinnate or bi- tri- quadri-pinnate, the fertile with linear contracted segments. Rhizomes squamose, scandent (Greek, "many"/ and grapes", referring to the massed sporangia).

A small genus of about 30 species in tropical countries, 2 in China. The genus somewhat related to Dryopteris, but characterized by having massed sporangia covering the entire under-surface of the fertile fronds as in Acrostichum, to which the species of this genus have previously been frequantly referred.

Key to species.

1. Sterile pinnae pinnatifid into oblong obtuse lobes; lower fertile pinnae to 6 cm. long, veins in fertile leaf twice forked........................1. P. sinense

1. Sterile pinnae only crenate; lower fertile pinnae to 2 cm. long; veins in fertile leaves simple...2. P. appendiculata.

1. Polybotrya sinensis (Baker) C. Chr. Ind. Suppl. 57. (1913); Matthew 376, (1911).

Acrostichum sinense Baker, Kew Bull., 14-15 1906.

Rhizomes shortly creeping; stipes contiguous, slender; pale, naked or obscurely paleaceous, sterile fronds 15-20 cm. long, fertile fronds much longer; sterile lamina oblong lanceolate, bipinnatifid, 15-45 cm. long, 15-20 cm. broad, membranaceous, green and glabrous on both surfaces, sometimes radicant near apex; pinnae lanceolate, sessile, pinnatifid toward the middle, lobes oblong, obtuse, 4 mm. broad, lower pinnae not reduced; veins free, pinnate in lobes of pinnae; veinlets ascending, 5-7-jugate, forked at the base, fertile lamina with linea-lanceolate (obtuse or rounded smaller pinnae, lower ones petiolate 3-4 cm. apart, subentire, opposite or subopposite.

Yunnan.

Differs from the preceding species by broader lobes of pinnae and lobes not parted again.

(P. 100).

2. *Polybotrya appendiculuta* (Willd.) J. Sm. Jeb. 4. 156, (1841);
Christ 43; NPFL. 196; Matthew 376, (1911).

Acrostichum appendiculutum Willd., Sp. 5. 114, 1810; NKBK. 415.
Bolybotrya marginata Bl., 1828.
Gymnogramme rhizophylla Klf., 1824.
Arostichum hamiltonianum Wall., 1828.

Rhizomes firm, woody; sterile fronds 15-45 cm. long, 10-20 cm. broad, simply pinnate, sometime rooting at the apex; stipes 7.5-15 cm. long, erect, naked or slightly scaly; pinnae 5-10 cm.long, 9-18 mm. broad, the edge varying from subentire to cut halfway down the midrib into blunt lobes, the upper side often auricled, the lower one obliquely truncated at the base, of subcoriaceous texture; both sides naked; rachis often rather scaly; fertile fronds narrower, on a longer stipe, the pinnae roundish or oblong, often distinctly stalked.

Himalaya, Ceylon, Philippines, Formosa, Hongkong, China: Hainan, Kwangtung.

23. Cyclopeltis J. Smith, Bot., Mag. 72. Comp. 36, (1846).

Type: Polypodium semicordatum Sw.

Sori round, transverse, 2-4-serial on each side of the midrib; inducium peltate. Fronds pinnate, 30-90 cm. long; pinnae entire, falcate, lanceolate, sessile, auriculate at the base, articulate with the rachis; veins free, erecto-patent, 2-3-times forked or branched; veinlets free, the lower inferior and exterior ones sporangiferous, sori dorsal or sometimes terminal. Rhizomes oblique, decumbent; stipes not articulate to the rhizomes.

Sp. 4, in tropical Asia, one from tropical America, 2 in China.

Key to species.

I. Base of pinnae truncate or cordate...1. *C. semicordata*
II. Base of pinnae hamato-recurvate......2. *C. presliana*

1. *Cyclopeltis semicordata* (Sw.) J. Sm. Bot. Mag. 72. Comp. 36, (1846); NPFL. 183.

Polypodium semicordata Sw., 1788.
Aspidium semicordata Sw., 1801, NKBK. 249.

Nephrodium semicordata Presl., 1825.
Dryopteris semicordata O. Ktze. 1891.
Aspidium caducum Hooker, 1813.

Stipes scattered, 15-30 cm. long, fibrillose at the base; fronds 1/3-1 m. long, 20-30 cm. broad, simply pinnate; pinnae spreading, 10-15 cm. long, 1.2-1.8 cm. broad, nearly entire, acuminate, cordate or acuminate at the base; texture papyraceo-herbaceous or subcoriaceous, both sides nakes and rachis nearly so; veins pinnate, the lower ones ending short of the edge; sori in 1-3 rows on each side, the inner one the most constant and regular, close to the midrib.

Tropical America, recently discovered in Yunnan and Hainan.

The discovery of this species in China is phytogeographically interesting.

(P. 101).
2. Cyclopeltis presliana (J. Sm.) Berkeley in Introd. Crypt.
Bot. 513, (1875); NFFL. 183.

Lastera presliana J. Sm., Jou. II. 412. 1831.
Polystichum presliana Moore, 1857.
Aspidium hingii Hance, 1824.

Closely near to C. semicordata J. Sm., but differs in stipes clothed with long, spreading scales, which are bown and subulate; pinnae numerous, distant or approximate, sreading, the edge entire, crenato-sinuate or subrepand, highest pinnae often confluent with the terminal one, the upper base subcordate or rounded to slightly auricled, the lower base conspicuously auricled with an oblong, rounded humato-recurvate lobes which is adpressed on the rachis; veins less branched than in semicordata; sori in a single line.

Malaya, Burma, N. Guinea, China: Hainan.

Var. biauriculata v. A. v. R. with the upper base having a conspicuously, deltoid more or less deflexed auricle, which has the apex obliquely truncate. Known from Malaya, Burma, Tonkin, not yet recorded in China.

24. Dryopteris Adanson, Fam. des Plantes 2. 20, (1763).

Type: Polypodium filixmas L.
(Nephrodium filixmas Rich.).

Sori numerous, globose rarely elliptical, medial or subterminal on the veinlets in regular rows, indusiate or non-indusiate; indusium, if present, usually reniform or horseshoe-shaped, attached to the frond by the sinus, deciduous or persistent. Fronds elongated, simple pinnate or 2-4-pinnate, the veins free or the lower ones anastomosing and forming on

each side of the midribs of the pinnules a simple row of regular deltoid areolae with an excurrent veinlets, springing from the apex, free or jointed with the angle of the next upper anastomosing veins, often forming one or more rows of rhomboidal areolae between the costal ones and the margin. Pinnules mostly equilateral, entire, toothed or lobed, glabrous, peberulent or ciliate. Rootstocks creeping or erect; the stipes scattered or clustered, not jointed to the rootstock (Greek, "oak" and "fern").

One of the largest genera among the ferns, consisting over 1000 species widely dispersed in all parts of the world and have been variously known under Lastrea, Aspidium, Nephrodium and Polypodium to some extent. From Nephrolepis the present genus differs in pinnae being not articulated to the achis.

Key to sections

1. Veins free.
2. Sori induciate, inducia reniform............§ Lastrea
2. Sori exinduciat
3. Sori round..................................§ Phegopteris
3. Sori oblong, sometimes linear............§ Leptogramma
1. Veins anastomosing
2. Sori induciate, inducia reniform, peltate, round or cordate..................................§ Cyclosorus
2. Sori exinduciate
3. Sori free, i. e. the contiguous pair never confluent;
4. Sori round............................§ Coniopteris
4. Sori oblong or sometimes linear.......§ Stegnogramma
3. At least the lower contiguous pairs of sori confluent and not rarely running along the excurrent veinlets. Sori oblong, rarely round..................................§ Meniscium

§ Lastrea.

1. Fronds not cut down to the main rachis.

1. Dryopteris decursive-pinnata (Van Hall.) O. Ktze. Rev. Gen. Pl. 2. 812, (1891); Matthew 361, (1911).

Polypodium decursive-pinnatum van Hall., Nieuwe. Verhdl. v. d. Nederl. Inst. 5. 204 c. tab. 1836.
Aspidium decursive-pinnatum Kze., 1844; Mett. n. 177.
Phegopteris decursive-pinnate Fee, 1850-52; Christ 275.
Nephrodium decursive-pinnatum Baker, HKBK. 259; NPFL. 170.
Lastrea decursive-pinnara J. Sm., 1866.

Stipes tufted, 7.5-10 cm. long,; with linear scales throughout; fronds 30 cm. or more long 7.5-10 cm. broad; pinnae linear, 2.5-5 cm. long, 6 mm. broad, the edge more or less deeply

pinnatifid, the bases connected by a broad lobed wing, the lower ones gradually reduced and sometimes distinct, texture herbaceous, rachis scaly; under surface slightly hairy; lower veinlets subpinnate; sori copious, scattered; indusium minute, fugacious.

Japan, Formosa, Korea, China: Kwangtung, Hupeh, Kiangsi, Chekiang, Fukien, Anhwei, Kweichow, Yunnan, Szechwan, Hunan, Kiangsi.

2. Dryopteris mairei (Christ) Brause, Hedwigia 54, 206, t. 4. J. (1914).

Rhizome short, ascending, densely radicose, clothed in brown, lanceolate, acuminate, entire paleae about 4 cm. long. Leaves fasciculated, long petiolate; petiole 4-14 cm. long, dark-purple, shinning, terate, 0.8-1 mm. thick, with base clothed in the similar paleae. Lamina coriaceous, 9-10 cm. long, 9-11 cm. broad, very glabrous, olive-green above, paler below, subtriangular, caudato-acuminate, pinnatifid, mostly quadripartted into 3-4 linear-lanceolate, acuminate segments 8-9 mm. broad at base, decurrent, the wings on the rachis about 2 mm. broad; segments all falcate-patent, the upper entire, the lower 2 mm. broad; segments all falcate-patent, the upper ones entire, the lower 2 pairs subentire on the upper margin, with the lower margin cut into 2-4 linear-lanceolate lobes 4-27 mm. long rachis, costa and costules dark-purple; indusium narrow, 0.8 mm. broad, margin crenulate, covering the whole underside of the lamina.

Yunnan: Tong-tchouan.

Much related to Dryopteris duclouxii Christ, but differs in its somewhat larger segments and in the absence on the underside of the frond of yellow wax-coating.

(P. 103).
Dryopteris /pedata (Desv.) O. Ktz. Rev. Gen. Pl. 2. 813, (1891).

Aspidium pedata Desv., Prod. 244, 1827; Mett. n. 277.
Camptodium pedata Fee, 1850-52.
Nephrodium pedata Hooker, 1862, HKBK. 259; HPFL. 170.

Stipes tufted, 10-15 cm. long, glossy, ebeneous; fronds 7.5-10 cm. each way, cordate-deltoid, deeply pinnatifid; upper lobes broad, blunt, subentire, the lower deeply lobed on the lower side; texture coriaceous, both sides naked, veins in pinnatifid groups, causally anastomosing; sori large, in rows near the main veins.

India, China: Yunnan.

1. Frondssimple pinnate,
Pinnae entire or lobed less
than one-third way down to
the midrib.

Dryopteris bodinieri (Christ) C. Chr. Ind. 254, (1905); Matthew 360, (1911).

Aspidium bodinieri Christ, Bull. Geogr. Bot. Mans. (1902) 248 c. fig.
Nephrodium cyclodioides Bak., Kew Bull. 10. 1906.

Rhizome, stipes, rachis naked, stramineous, frond ample simple, pinnate, pinnae suberect, sessile, adnato-obcurrent upward, 32 cm. long, 5 cm. broad, lanceolate, shortly attenuate, towards base, coarsely acuminate and not deeply dentate teeth scarcely 1 mm. deep, 5 mm. broad, serrate, costa brown, stramineous stout, 1 mm. broad lateral veins about 50 on each side of costa slender 7 mm. apart pinnate, i. e. 5-6 branched on each side, veinlets free, short, all oblique erect, except the uppermost 2, sori 8-9 to each group of veins globose slightly impressed, up to 1 mm. broad, rufo-brown; inducium not seen, caducious; texture papayraceous-coriaceous color sicca ochraceous-green upon drying; entire plant very glabrous.

Kweichow, Szechwan, Yunnan.

Probably a large form of D. enneaphyllum (Bak.) C. Chr.

Dryopteris decipiens (Hk.) O. Ktze, Rev. Gen. Pl. 2. 812, (1890); Matthew 361, (1911).

Nephrodium decipiens Hooker, Sp. 4. 86 t. 243, 1826; HKBK. 27; HKBK. 260; MFFL. 168.
Aspidium decipiens Luerss., 1883.

Stipes wiry, substramineous; fronds 20-25 cm. long, 10-12.5 cm. broad, lanceolate-deltoid; pinnae spreading, 5-7.5 cm. long, 9 mm. broad, the edge very slightly and broadly toothed, cordate at base, lower pair stalked, about equalling the next, texture subcoriaceous; rachis slightly fibrillse; both surfaces naked; veins pinnate, inconspicuous; sori in two rows near the midrib.

Hongkong, Liu Kiu, Swatow, Hupeh, Hunan, Kiangsi, Kweichow, Yunnan, Kwangtung, Chekiang - Tia-tai Shan.

A native in China.

Dryopteris enneaphylla (Baker) C. Chr. Ind. 263 (1905); Matthew in Journ. Linn. Soc. 38: 362 (1911).

Nephrodium enneaphyllum Baker, Journ. Bot. (1887) 170; Diels in Nat. Pfl. Fam. I. 4. 168.

Caudex erect, thick as a thumb, clothed in dense reddish-brown lanceolate acuminate membranaceous scales to 2 cm. long; stipes tufted, stramineous, terete beneath, deeply grooved above and so is the rachis, nearly a foot long, densely scaly near the base, become rather sparse
(P. 104).
upward, scales at the base similar to those on rhizome; frond deltoid-oblong, 20-30 cm. long and a little less broad, oddly simply pinnate, moderately firm in texture, green and glabrous on both sides; pinnae 3-5 on each side under the terminal one similar to the lateral ones, shortly petiolate, lanceolate, oblong, 10-13 cm. long, 2.5 cm. broad, shallowly crenate, truncate or subtruncate at the base, blunt at the apex; veins in numerous pinnate subpatent groups, veinlets fine, all free, ascending, 3-4 on each side of the lateral veins; sori large, in 3-4 irregular rows, almost restricted to the central half of the pinnae, leaving a broad free margin, medial on the veinlets, indusium large, peltate,brown, glabrous, with a slightly depressed centre, subpersistent.

Distribution: Hupeh, Fukien.

A rather variable species, evidently intermediate between D. podophylla (HK.) and D. siebodii (van Houtte) with a much stronger approach to the latter. It was discovered by A. Henry, around Ichang, W. Hupeh, Baker's discription was based upon Henry's No. 3217, which has rather deeply lobato-incised pinnae with truncate or subtruncate base, while his No. 7881 from the same locality deviates from the type in much larger pinnae (to 17 cm. long, 3.5 cm. broad) with rounded base, shallowly crenulato-serrate margin, and 1-2 irregularly seriate sori, confined to the inner half breadth of the pinnae. Dunn's specimen, No. 3830, from Central Fukien, 1905, agrees well with Baker's type except that it has still more finely crenato serrate margin than Henry's No. 7881, and yet I am sure it must belong here.

Dryopteris dickinsii (Franch. and Sav.) C. Chr. Ind. 272, (1905); Matthew 361, (1911).

Aspidium dickinsii Franch. and Sav., Enum. Pl. Jap. 2. 236. 629, (1879).
Nephrodium dickinsii Bak., 1886; NPFL. 168.

Rhizomes...; fronds 60 cm. high, tufted, subcoriaceous, petiole as thick as a raven's quill, 20 cm. long, the base obtusely 4-angular, the upper deeply sulcate, base blackish and densely clothed with yellowish ovate lanceolate, denticulate sparingly fimbricate scales, those on the upper part are sparce, linear and entire; lamina 40 cm. long, 16-18 cm. broad, simple pinnate; rachis stramineous, channelled above until the apex, blackish punctate and clothed with dark-linear sparce paleae; pinnae 28 on each side; contiguous, sessile, abruptly truncate at base, narrowly lanceolate, 12-15 mm. long, the lower ones

conspicuously decresent, the lowest pair 4 cm. long, free, or the upper 25 ones adnate, all closely crenulate, crenuses scarsely 2 mm. high, apex truncate denticulate, sinuses very narrow, rachis of the pinnae densely paleaceous on insections, otherwise glabrescent, the upper surface broadly channelled; veins distinctly impressed on the upper surface free; the tertiary veins simple, 4-5 on each side, the margin of the lowest ones not touching the anterior side, apex thickened; sori solitary on forked veinlets distant from costule and margin, rather small; inducium reniform, coriaceous, margin entire; spores fusco-lulescentes, light-coloured, cristately marginate.

Japan, China: Kweichow, Yunnan, Hupeh.

(P. 105).
Dryopteris faberi (Baker) C. Chr. Ind. 264, (1905); Matthew 362, (1911).

Nephrodium faberi Baker, New Ferns 56; Ann. Bot. 5. 316, (1891); NPFL. 168.

Stipes stramineous, 15-23 cm. long, clothed up the top with ovate brown membranaceous paleae; fronds oblong-lanceolate, simple pinnate moderately firm, 15 cm. long, 7.5 cm. broad, scattered over with scales beneath; rachis paleaceous; lower pinnae longest, lanceolate, sessile, 6-8 mm. broad, auricled on the upper side at the base; veins obscure; sori principally in two rows near the midrib of the pinnae, inducium small, evanescent.

Chekiang: Ningpo.

Near Dryopteris decipiens and Dryopteris dickinsii.

Dryopteris hirtises (Bl.) Kze, Rev. Gen. Pl. 2. 813, (1891); Matthew 363 (1911).

Aspidium hirtipes Bl., Enum. 148, 1828; Christ 259.
Nephrodium hirtipes Hooker, 1862, HKBK. 261; NPFL. 168.
Lastrea hirtipes Moore, 1858.
Phagopteris atratum Bedd., 1876.
Aspidium pycnopteroides Christ, Bull. Geogr. Bot. Mans. 116. 1906.
Dryopteris pycnopteroides C. Chr., Ind. Suppl. 38, 1913.

Stipes tufted, 30 cm. or more long, densely clothed with long blackish fibrillose scales; fronds 60-90 cm. long, 20-40 cm. broad; pinnae 10-20 cm. long, 1.8-2.1 cm. broad with broad blunt lobes reaching from a quarter to a third down, lower ones not reduced; texture herbaceous; rachis fibrillose like the stem; both surface naked; veinlets 4-5 on a side; sori medial on the veinlets; inducium small, reniform, subcoriaceous.

Himalayas, Ceylon, Himalayas to China: Szechwan - Omei Shan, Hupeh, Chekiang, Szechwan, Kweichow, Fukien, Kwangtung, Yunnan; Korea.

In habit this species quite resembles D. filixmas

Aspidium pycnopteroides Christ is a large form with broad oval frond or rather a thiner texture, larger sori with large persistent indusium and rachis covered with light brown (not blackish) scales.

Dryopteris khasiana C. Chr. Ind. 272, (1905); Matthew 363, (1911)

Polypodium elongatum Wall., 1828; Hk. Sp. 4. 234, (1862).
Aspidium cuspidatum Mett., 1858.
Nephrodium cuspidatum Baker, HKBK. 260; NPFL. 168.
Lastrea cuspidata Bedd., 1870.
Christella khasiana Lev., 1915.

Stipes 30 cm. or more long, naked, densely scaly at the base, fronds 60-90 cm. long, 20-30 cm. broad; pinnae 10-15 cm. long, 1.2 cm. broad, the edge sharply inciso-serrated to the depth of 1-2 mm., texture payraceo-herbaceous or subcoriaceous; rachis and both sides naked; veins in pinnate groups with 3-4 veinlets on a side, indusium fugacious.

Ceylon, N. India, China: Kweichow, Yunnan.

Dryopteris otaria (Kze) O. Ktze. Rev. Gen. Pl. 2. 813, (1891).

Aspidium otarium Kze, 1858; Christ 249.
Neprodium otaria Baker, 1867, HKBK. 238; NPFL. 178.
Nephrodium aristatum Hooker
Pleocnemia aristatum Bedd., 186-3-65
Polypodium subpectinatum Wall., 1828.
Nephrodium subpectinatum Bedd., 1892.

Stipes 15-50 cm. long, substramineous; fronds 30 cm. or more long, with a linear-oblong terminal pinna 10-15 cm. long, 2.5-3.7 cm. broad, the apex acuminate, the margin with finely serrated lanceolate lobes reaching ¼-1/3 of the way down and 3-6 distant spreading similar lateral ones on each side, the lower ones stalked; texture thinly herbaceous; rachis and both surfaces naked; veins pinnate on each lobe, the groups united from about midway from the midrib to the edge; veinlets 6-8 on each side, with sometimes a sorus on each.

Dryopteris podophylla (Hooker) O. Ktze, Rev. Gen. Pl. 2. 813, (1891); Matthew 366, (1911).

Aspidium podophyllum Hooker, Job. 5. 236 t. 1. 1853; Mett. n. 125; Christ 250.
Nephrodium podophyllum Hooker, HKBK. 260; NPFL. 168.
Lastrea podophylla Hk., 1857.

Stipes tufted, 30 cm. long, naked upward, scales at the base black and fibrillose; fronds 30-45 cm. long, 20-30 cm. broad; pinnae 4-8 on each side, erecto-patent, 10-15 cm. long,

1.2-1.6 cm. broad, the edge nearly entire or with shallow, broad, blunt lobes; texture subcoriaceous, rachis and both surfaces naked; veins pinnate in the lobes with 2-4 veinlets on side, with sometimes a sorus on each, distant from the main veins.

Chusan; Hongkong, China: Shensi, Szechwan, Hupeh, Chekiang,

Differs from the other species of the group in having a distinct terminal pinna similar to the lateral ones in outline; while in others, the apex of the frond is pinnatifid.

Dryopteris sieboldii (van Houtte) O. Ktze, Rev. Gen. Pl. 2. 813, (1891); Matthew 367, (1911).

Aspidium sieboldii van Houtte, Mett. Fil. Lips, 87 t. 201 f. 1-4, 1856; Christ 250.
Nephrodium sieboldii Hooker, HKBK. 261; NPFl. 168.
Polystichum sieboldii Keys., 1873.
Lastrea Podophylla J. Smith, 1857.
Aspidium podophyllum Lowe, 1857 (non Hooker 1853).

Caudex tufted, with large brown lanceolate-scales; stipes 15-30 cm. long, scaly below; fronds with an entire or slightly toothed lanceolate oblong terminal pinna 20-30 cm. long, 3.7-5 cm. broad, and 2-4 similar ones on each side, the lowest shortly stalked; texture coriaceous; rachis and both surfaces naked; veins in pinnate groups; sori large, copious, scattered. sori large, copious, scattered.

Japan, China: Kweichow, Szechwan, Kwangsi.

Dryopteris sheareri (Baker) C. Chr. Ind. 292, (1905); Matthew 367, (1911).

Nephrodium sheareri Baker, Job. 200, 1875.
Nephrodium isolatum Baker, 1880.

Caudex not seen, stipes 15 cm. long, slender, stramineous, naked like the rachis with a few very small spreading linear brown scales at the base; lamina deltoid, simple pinnate, 20-23 cm. long, upper pinnae close, the lower ones with a space between them, lowest two pairs petiolate, 7.5-10 cm. long, 1.8-2.2 cm. broad cut 1/3-½ down to the costa into blunt, sharpely toothed, ascending lobes 6-8 mm. broad, base of pinnae broad-deltoid or the lowest more cut away on the lower side of the base; veins pinnate in the lobes; veinlets
(P. 168).
distinct, much ascending, 4-5 on each side, all simple, texture membraneous, both surfaces green and quite naked; sori medial on the ultimate veinlets; indusium minute and soon evanescent.

Texture and sori of D. khasiana (Baker), but quite different for it smaller fronds, with much fewer and broader pinnae.

Kiangsi - Kiukiang.

14. Dryopteris thibetica (Franch.) C. Chr. Ind. 298, (1905); Matthew 367, (1911).

Nephrodium thibeticum Baker, 1891.
Aspidium thibeticum Franch., Pl. David. 156; Nouv. Arch. Mus. II. 10. 118, 1887.
Lastrea thibetica Bedd., Handb. Suppl. 51, 1892.

Rhizomes, stipes thickly clothed with tawny narrowly lanceolate scales, scarcely 15 cm. tall; fronds almost 60 cm. long, about lanceolate, 17 cm. broad toward the middle, narrowed from the base, papyraceous, pale green, pinnate; rachis slender, covered by linear brownish or tawny dense paleae; pinnae 25-30 on each side, sessile, narrowly lanceolate, base scarcely broader, acuminate, spreading, slightly falcate, clothed underneath with thick minute scales near the veinlets, 10 cm. broad in the middle, 1.8 cm. broad near base, the lowest 1.8-3.1 cm. long, scarcely divided into 4 equal lobes; lobes ovate-rounded, margin cartilagineous, obscurely denticulate; veins pinnate, tertial veinlets 6-7, simple, arcuato-denticulate below; sori small, borne only above the middle of the frond, 4-8 to a lobe, seriate between veins and margin; indusium small, coriaceous, reniform, margin entire, soon deciduous.

Yunnan; Moupine; Szechwan.

Likely a variety of D. hirtipes (Bl.) Ktze.

Pinnae cut more than half way down to the rachis into close, regular, entire or nearly entire lobes.

V. Veins simple.

Dryopteris Cana (J. Sm.) O. Ktze, Rev. Gen. Pl. 2. 812, (1891); Matthew 360, (1911).

Lastrea cana J. Sm., 1857.
Nephrodium canum Baker, HKBK. 267.
Lastrea bergiana Bedd, 1876.
Christella Cana Lev., 1915.

Stipes densely tufted, 15-20 cm. long, slender, finely villose; fronds 10-30 cm. long, 7.5-10 cm. broad; central pinnae 5 cm. long, 1.2 cm. broad, gradually narrowed from the base to the point, cut down nearly to the rachis into close slightly crenated lobes 3 mm. broad; lower pinnae distant and dwindling down gradually; texture herbaceous; rachis slender, finely villose and both sides slightly so; veinlets 6-8 on a side; sori submarginal indusium thin, fugaceous.

Sikkim, China: Kweichow.

New to China.

Dryopteris calcarata (Bl.) O. Ktze., Rev. Gen. Pl. 2. 812, (1891); Matthew 360, (1911).

Aspidium calcaratum Bl., Enum. 159, 1828; Christ 255. (P. 109.).
Nephrodium falcilobum Hooker, 1862, HKBK. 264, 294; NPFL. 171.
Aspidium ciliatum Wall., 1857.
Nephrodium ciliatum Clarke, 1880.

Stipes densely tufted, stramineous, villose above; frond 30 cm. long, 9-12 mm. broad, cut down two-thirds or more to the rachis into oblique, subfalcate, linear-oblong, acute or blunt lobes; colour dark-green; rachis villose; texture herbaceous or subcoriaceous, under side more or less villose; veinlets 3-6 on each side; sori medial, induclum glabrous, persistent.

N. India, Philippines, Malaccas, Ceylon, Hongkong, China: Hainan, Yunnan, Kweichow, Szechwan.

Very near D. thelypteris Gray, but taller and firmer, the rachis much more pubescent and often the pinnae also; the pinnae falcate, more acuminate, attaining 10 cm. in length and their lobes lobes lanceolate-falcate and acute.

Dryopteris beddomei (Baker) O. Ktze, Rev. Gen. Pl. 2. 812, (1891); Matthew 360, (1911).

Nephrodium beddomei Baker, 1867, HKBK. 267; NPFL. 172.
Lastrea gracilescens Beddome, 1863-65, non Aspidium Bl. 1828.

Rhizomes slender, wide-creeping; stipes 15-24 cm. long, slender, glossy; fronds 15-30 cm. long, 7.5-10 cm. broad, oblong-lanceolate; central pinnae the largest, 3.7-5 cm. long, 9 mm. broad, cut down to the rachis into close rather acute, entire lobes very gradually; texture firm; veins beneath villose; veinlets 4-5 on a side, the sori close to the incurved margin.

India, Formosa, Ceylon, Java, China: Yunnan, Hupeh, Szechwan, Kweichow, Phillippines.

This comes nearest to Dryopteris noveboracense Gray of Cannada and United States, but is smaller, and more slender, with much fewer veins and firmer texture. The pinnae gradually diminated down, the lower ones very remote and reduced to mere pinnatifid auricles.

Dryopteris barbigera (Moore) O. Ktze, Rev. Gen. Pl. 2. 821, (1891); Matthew 370, (1911).

Lastrea barbigera Moore Ib.
Lastrea barbigera Bedd., 1867.
Nephrodium barbigerum Hooker, sp. 4. 113, 1862; HKBK. 274; MPFL. 173.
Aspidium barbigerum Christ, Farn. Erd. 260.
Nephrodium falconeri Hooker, 1862; HKBK. 277.
Lastrea falconeri Bedd., 1865.

Stipes 30 cm. long, densely clothed throughout with concolorous scales varying from ovate to subulate; fronds 45-60 cm. long, 20-25 cm. broad, oblong-lanceolate; pinnae 10-12.5 cm. long, 3.7-5 cm. broad, largest pinnules 2.5 cm. long, 6 mm. broad, cut down nearly to the rachis into oblong, blunt lobes with revolute edges; texture herbaceous; rachis densely fibrillose; sori in rows close to the midrib of the pinnules.

Kashmere, China: Yunnan, Kansu, Szechwan.

__Dryopteris chrysocoma__ (Christ) C. Chr. Ind. 257, (1905); Matthew 361, (1911).

Aspidium filixmas var. chrysocoma Christ, Bull. Boiss. 6. 966, 1898.
Aspidium chrysocoma Christ, Bull. Geogr. Bot. Man. 253, (1902).
Nephrodium chrysocoma Hand.-Mzt., Symb. Sinic. iv. 24. 1929.

Rhizomes suberect, thick, cushioned with very lanceolate subulate scales over 1 cm. long; stipes 17 cm. long, stout; leaves bipinnate, broadly ovate-deltoid, 30 cm. long, 15 cm. broad, the lower pinnae slightly reduced; rachis firm, thick, rufescent; pinnae 8 cm. long, very patent rather remote, sessile, broader at base, oblong, 2 cm. broad, cut down on each side to rachis below the apex into remote ovate rotundato-obtuse, minutely crenate segmenta 1 cm. long, [illegible] cm. broad, veins in segments pinnate, numerous, forked; lamina glabrous, pale green, texture papery firm; sori few, not more than 6, often 4-2 placed at the base of the segments, large, turgid; indusium firm, persistent as in D. filixmas Sw. or D. paleacea Moore, gray, reniform.

Endemic in China: Yunnan, Kweichow.

__Dryopteris cochleata__ (Don) Moore var. squamosa C. Chr. Medd. Goteb. Bot. Tradg. [illegible]. 59, (1924).

Differs from the type in stipes and rachis being very densely paleaceous. The scales on the stipes broadly ovate, 1-1.5 cm. long 5-8 mm. broad, dark brown or nearly black and glossy near the base, otherwise light brown, very thin, nearly hyaline, entire, thus resembling the scales of D. dilatata (Hoffm.); scales of rachis similar in color but lanceolate and smaller,

varying from hair-like fibrils to scales, 1 cm. long, 1 mm. broad; some similar ones are found on the midribs of pinna beneath. Lamina ovato-lanceolate, somewhat narrowed at base.

India, China: Szechwan - Teng-hsiang-ying.

Dryopteris cochleata (Don) C. Chr. Ind. 258, (1905); Bedd. Ferns Ind. t. 115; Matthew 361, (1911).

Nephrodium cochleata Don, F. Nepal. 6. 1825.
Lastrea cochleata Moore, 185~~6~~7.
Lastrea cochleata Moore, 1857.
Nephrodium filixmas J. Hk., HKBK. 272.
Lastrea filixmas var. cochleata, Bedd. Ferns Brit. Ind. 251, (1885).

Fronds truncate at the base, generally dimorphic, pinnate or subpinnate in the sterile, bipinnate in the fertile; indusium very large and completely covering the under-surface of the contracted fertile pinnules, but the broader fronds are sometimes partially or even wholley in fructification, rachis glabrous or sometimes scaly.

India, South Malacca, China: Yunnan, Szechwan.

Dryopteris cnemidaria Christ, Bull. Geogr. Bot. Man. 140, (1910) Matthew, 361 (1911).

Rhizomes and stipes;....; fronds ample, over 1 m. tall; rachis like the other parts very glabrous, stramineous-green, sulcate, lucid, thick as a swan's quill, lamina bipinnatifid, the lower pinnae opposite, on petioles 2 cm. long, erecto-patent, 30 cm. long, 11 cm. broad, acuminate, lobed in the basal ones, and incised in the upper ones to a wing 5 mm. broad; segment close, basal ones not shortened, erecto-patent, about 35 on each side, lanceolate-acuminate, 5 cm. long, 9 mm. broad, acutely crenato-lobulate, lobules about 20 on each side, veins in the lobules conspicuous, pinnate, free, extending to the margin, veinlets oblique, 3 on each side, sori much immersed, medial, place on the anterior basal veinlets, solitary, rarely on posterior veinlets and then 2 to each lobule, caviform, indusium numbraneous, ovate, persistent, diaphanous, margin fimbricate; texture papyraceous, color light green.
(P. 111).
Kweichow.

Dryopteris eatoni (Baker) O. Ktze. Rev. Gen. Pl. 2. 812, (1891). Matthew 361, (1911).

Nephrodium eatoni Baker, HKBK. 276, 1867.

Stipes 30 cm. long, stramineous, clothed copiously with squarose purplish fibrillose scales; fronds 30-45 cm. long, 15-23

cm. broad, ovate-lanceolate; upper pinnae lanceolate, lowest pair subdeltoid, 10-12.5 cm. long, 5-7.5 cm. broad; pinnules lanceolate, close, cut down nearly or quite down to the rachis into close, blunt subentire, linear-oblong lobes; texture herbaceous; rachis stramineous and fibrillos like the stem; under side slightly villose and glandular; sori small, copious, indusium gland-ciliated.

Makeah, Loochoo, Formosa, China: Kwangtung, Hainan.

Dryopteris eberhardtii Christ, Journ. Bot. Fr. XXII. 231, 262, (1908); Matthew 361, (1911).

Stipes 40 cm. long, base thick as a goose's quill; glabrous, castaneous. Fronds bipinnatifid, 45 cm. long, acuminate 20 cm. broad, oblong abruptly reduced towards the base into remote numerous (about 7), auricles which are shortly laciniate with stipitate almost approximate base. Pinnae erect patent, the lower ones opposite, sessile, base slightly dilated, lanceolate, acuminate, cut all the way down to a narrow wing, segments closely pectinate, falcate oblong, rather acute, about 30 on each side, subentire, veins in segment pinnate, simple, about 10 on each side, sori medial, ochraceous, at last brown, almost contiguous, 8 on each side, rounded, 1 mm. broad, indusium pale ochraceous, reniform, glabrous, entire, fugaceous; rachis costa, costule and veins densely pilose, rigid, patent, whitish hirsute also, the upper surface pilose and ciliate, rachis dark-colored, texture herbaceous, color obscurely green.

Indo-china, China: Yunnan, Kweichow.

Dryopteris eberhardtii Christ var. glabrata Christ, Not. Syst. 1. 50, (1909).

Stipes and rachis fulvo-stramineous (and not dark-reddish), glabrous, on the upper surface of the pinnae, (and not hispidate with rigid whitish pilise) softly pillose pubescent on the under surface; segments narrower, acute, falcate, pectinato-confert; sori dark-brown, numerous.

China: Yunnan.

Dryopteris gracilescens (Bl.) O. Ktze, Rev. Gen. Pl. 2. 812, (1897); Matthew 365, (1911).

Aspidium gracilescens Blume, Enum. 155, 1826.
Nephrodium gracilescens Hooker, 1862, BKBK. 262.
Christella gracilescens Lev., 1915.

Rhizomes wide-spreading; stipes 15-23 cm. long, slender, naked; fronds oblong, 30 cm. long or more, 15 cm. broad; pinnae 5-7.5 cm. long, 9-12 mm. broad, cut down within a short distance

of the rachis into close linear-oblong entire lobes 3 mm. broad, the lowest pair deflexed; rachis and both sides nearly naked; veinlets 4-6 on a side; sori nearly terminal on veinlets indusium naked.

Java, Japan, N. India, China: Yunnan, Chekiang, Shensi, Kansu, Hunan, Hupeh, Fukien, Szechwan - Omei.

var. *chinense* Christ, Not. Syst. I, 40, (1909).

Pinnae confert, the lower ones deflexed, deeply incised, segment pectinato-confert, narrow.

Yunnan.

var. *ducloux ii* Christ, Not. Syst. I. 41, (1909).

Pinnae remote, the lower ones scarcely deflexed, incised on each side of costa to a wing 1.5 mm. broad, segments 4 mm. broad, obtuse.

Yunnan.

var. *hirsutipes* Clarke, Bedd. Ferns. Brit. Ind. 254, (1883); Matthew 363, (1911).

Lastrea hirsutipes Bedd., Ferns. Brit. Ind. Suppl. 17. t. 377, (1876).

Differs from the type in having hirsute stipes and rather thicker texture.

N. India, Hongkong.

var. *glanduligera* (Kze.) C. Chr. Ind. 268, (1906).

Aspidium glandulgerum Kze., 1837; Mett. n. 207.
Lastrea. gracilescens Moore, 1858.
Rachis hairy; under surface slightly glandular; indusium ciliate.
India, Japan, China: Kweichow, Anwhei, Kiangsu, Kiangsi.

Dryopteris japonica (Baker) C. Chr. Ind. 272, (1906).

Nephrodium japonica Baker, Ann. Bot. 5, 318, (1871).
Christella japonica Lev., 1915.

Stipes subcastaneous, 15 cm. long, frond lanceolate deltoid, bipinnate, membranaceous, finally downy, 30-37 cm. long, 20-25 cm. broad; rachis castaneo-stramineous, downy, not scaly, pinnae lanceolate, sessile, acuminate, the lowest the largest, 10-12.5 cm. long, 1.8 cm. broad, cut down to a narrow wing into obtuse subentire lobes 2.5-3.7 cm. broad. Veinlets simple, 8-9-jugate, sori supra-medial, indusium large, membranaceous.

Japan, Korea, China: Kweichow.

Var. elongata Ros. Fedde. Repert. 13. 131, (1914).

Stipes and rachis dark-purple, lamina elongato-lanceolate, subcoriaceous, stipes about 45 cm. long, sometimes to 50 cm. or longer, 10 cm. wide, the basal pinnae, proximate, equal or shorter, 6 cm. long, almost 1 cm. wide, the under surface of the pinnae adspersed by dense golden yellow globose glands; sori medial.

Kweichow - Pinfa

Dryopteris lunanensis (Christ) C. Chr. Ind. 276, (1905); Matthew 364, (1911).

Aspidium lunanensis Christ., Bull. Boiss. 6. 966, (1898).

Rhizomes clothed with long subulate dark-fuscous scales; stipes strong and like rachis and costa of the pinnae covered with linear-fibrillose black dense strigose scales; pinnae far apart the lowest ones deflexed, linear-lanceolate, strongly acuminate, 12 cm. long, 1½ cm. broad, cut regularly up to the middle into obtuse, contiguous, crenulate lobes veins in lobes pinnate, simple, free; sori reddish,
(P. 113.).
small, 2-3 on each side of costule in the middle part of the lobes sometimes over the entire lobes, indusium reniform, small.

Yunnan, Kweichow.

Dryopteris microlepis (Baker) C. Chr. Ind. Suppl. 36, (1913).

Nephrodium microlepis Baker, Kew. Bull. 10, 1906.

Caudex erect; basal paleae lanceolate, large, membranaceous, pale brown; stipes under 30 cm. long, stramineous, sparcely paleaceous, lamina oblong-lanceolate, bipinnatifid, 37-45 cm. long, 12.5-15 cm. broad, linear-subulate, brown; pinnae lanceolate, pinnatifid toward the middle, the middle ones 6.2-7.5 cm. long, 1.6-2.4 cm. broad, basal ones not reduced; lobes oblong, obtuse, obscurely crenate 4 mm. broad; veins pinnate, veinlets simple, ascending, 4-5-jugate; sori medial; indusium small, membranaceous, evanescent.

Yunnan.

Differs from Dryopteris hirtipes Hooker by pinnae becoming pinnatifid towards the middle and by small evanescent indusium.

Dryopteris mongolica (Franch.) C. Chr. Ind. 278, (1905); Matthew 364, (1911).

Nephrodium mongolicum Baker, 1891.
Asplenium mongolicum Franch., pl. David. 351.

Rhizomes long-creeping, thick as a goose's quill, apex densely clad in brown paleae, paleae reddish-brown, linear-lanceolate, acuminato-subulate, opque; petioles pales in color, 2.5-7.5 cm. long, covered with small linear-subulate scales; fronds pale green, softly velvety, 20-50 cm. long 5-5.8 cm. broad, narrowly lanceolate, strongly reduced towards the base, pinnatifid; lower pinnae ovate, remote, the middle ones lanceolate, all sessile, base slightly broader, auricled above, pinnae deeply lobed, lobes ovate, apex rounded, margin crenulate or denticulate; sori almost all horseshoe-shaped, confined only to the upper upright lobes; induscium soft, membranaceous, pale, margin laciniate; spore, brown, girdled by a narrow wing.

Korea, North China: Mongolia.

Dryopteris nipponica (Franch et Sav.) C. Chr. Ind. 279, (1905);
Matthew 364, (1911).

Aspidium niponicum Franch. et Sav., Enum. Fl. Jap. 2. 24 2, 636, 1879.
Nephrodium nipponicum Hand.-Mzy., Symb. Sinc. IV. 21. 1929.

Rhizomes....; stipes 35 cm. long, stramineous, shinning, clothed with sparce lanceolate, yellow paleae; lamina about 35 cm. long, narrowly lanceolate, decrescent towards base, 10 cm. broad in the middle, simple pinnate, villosulate on veins on both sides, texture rather firm; rachis shortly hispidulate, stramineous; pinnae alternate linear-lanceolate, acuminate, strictly sessile, about 30 on each side, patent, pinnatifid almost down to the rachis into oblong, obtuse, very entire lobes at last with margin revolute, scarcely 3 mm. long, the lowest pinnae the largest, distant, about 15 mm. long, the middle ones 6 cm. long, close; veins free, the veinlets simple; sori dense, seriate along costa, at last confluent and almost covering the whole under side of the frond; induscium fugaceous (not seen).

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Japan, Korea, China: Shensi Shansi, Kansu, Kweichow, Szechwan, Yunnan.

Closely allied to South Indian *D. Beddomei* (Bak.) O. Ktze, from which it differs somewhat by softer texture and flacheren and broader segment.

Dryopteris parathelypteris (Christ) C. Chr. Ind. 283, (1905);
Matthew 365, (1911).

Aspidium paraphelypteris Christ, Bull. Soc. Fr. 52 Mem. I. 36, (1905).

Rhizomes creeping, black, leaves fasciculate; stipes 30 cm. long, stramineous-red, clothed with few lanceolate ochreceous scales otherwise entire plant smooth; lamina oblong, 25 cm. long, 12 cm. broad, acuminate, base not attenuate; pinnae much remote, patent, 6 cm. long, 8 mm. broad, sessile, ligulato-lanceolate, acuminate, the lower ones with attenuate base, lobated 1/3 way down into rather broad very close lobes sinuses almost none, ovate-rounded, scarcely crenulate, numerous (about 25 on each side); veins about 5 on each side of the costule, simple; texture thinly herbaceous, color light green, the surfaces glabrous, margin minutely ciliate; sori 3-4 on each side of the costule, large, almost 1 mm. broad, not confluent, ochreceous, indusium pale, reniform, persistent, entire, paraphysis none.

Kweichow.

Dryopteris patens (Sw.) O. Ktze. Rev. Gen. Pl. 2. 813, (1891); Matthew 365, (1911).

Polypodium patens Sw., Prod. 133, 1788.
Nephrodium patens Desv., 1827, HkBk. 282; NrFl. 170.
Lastrea patens Presl., 1836.
Aspidium patens Sw., 1801; Mett. n. 208; Christ 251.

Rhizomes oblique; stipes 30 cm. or more long, naked or slightly pubescent frond 60-90 cm. long, 20-30 cm. broad; pinnae 10-23 cm. long, 1.2-1.8 cm. broad, cut down about three-quarters of the space to the rachis into linear-oblong subfalcate lobes, the lowest lobes not diminished; texture herbaceous; rachis and surfaces more or less villose; veinlets; 6-12 on a side; sori nearer the edge than the midrib; indusium persistent.

Tropical America, Polynesia, Japan, Angola, St. Helena, Formosa, China: Yunnan, Kweichow.

Dryopteris peregrina C. Chr. Ind. 284, (1905); Matthew 366, (1911).

Nephrodium regulale Baker, JoB. 200, 1875 non Desv. 1827).

Caudex not seen, stipes 30-45 cm. long, slightly scaly throughout, the scales near the base dense, lanceolate, spreading, pale brown, 1.2 cm. long; lamina oblong-lanceolate, bipinnatifid, 45-60 cm. long, 30 cm. broad; pinnae moderately close, sessile, linear-ligulate, the lowest the largest, 12.5-15 cm. long, 3-3.2 cm. broad at the middle, 1.8 cm. broad at base, cut down to a broadly winged rachis into close, blunt, rather ascending lobes 4 mm. broad; lower pinnae spreading, upper ascending, the base in all nearly truncate, veins simple, very distinct, 10-12-jugated in the central fully-developed pinnules, rachis clad in copious small spreading linear scales similar to those on the stipes; texture membranaceous, both surfaces naked; sori not seen.

Kiangsi - Kuikiang.

Not near any Asiatic species but resembling closely to Tropical American D. caripense.

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Dryopteris polylepis (Franch. et Sav.) C. Chr. Ind. 285, (1905); Matthew 366, (1911).

Aspidium polylepis Franch. et Sav., Enum. Pl. Jap. 2. 236, 1876, 631, 1879.
Nephrodium polylepis Baker, 1891.

Rhizomes unknown; stipes short, densely clothed with dark brown spreading paleae; lamina 40 cm. long, about 8-10 cm. broad, narrowly lanceolate in outline bipinnatifid; texture herbaceous; pinnae alternate, distant, 20 on each sides, gradually reduced downward; rachis sulcate densely paleaceous, paleae dissimilar, some linear, yellow long hair-pointed, others glaucescent, and pilose underneath, scaly on rachis, scales pale, ovate or oblong cuspidate, margin pectinate, truncate at base, narrowly lanceolate, acuminate, the lowest ones 2-3 cm. long, the middle ones 6 cm. long, 7-8 mm. broad, pinnatifid almost down to the costa, into falcate oblong crenulate segments; veins free, veinlets simple; sori.....

Japan, China: Shensi, Hupeh, Szechwan, Kansu, Yunnan.

Closely allied to or may be a form of D. filixmas subspec. fibrillose C. Chr.

Dryopteris prolixa (Willd.) O. Ktze, Rev. Gen. Pl. 2. 513, (1891); Matthew 366, (1911).

Aspidium prolixum Willd., Sp. 5. 251, 1810; Christ 254.
Nephrodium prolixum Desv., 1827 Bak. 268 (pt.); NPsL. 172.
Aspidium appendiculatum Wall., 1828 (pt.); Mett. n. 196 (non Bl. 1828).

Stipes 30-60 cm. long, firm, glossy, substramineous, naked or nearly so; fronds 2/3-1.33 m. long, 20-30 cm. broad; pinnae 10-20 cm. long 1.8-2.5 cm. broad, cut down nearly to the rachis into entire or bluntish, often falcate lobes 2-3 mm. broad, with a prominent gland at the base beneath, the lower ones gradually reduced, texture subcoriaceous; rachis and the under side more or less villose; veinlets prominent, 10-15 on a side; sori submarginal.

Africa, India, Ceylon, Mauritius, Bourbon, Polynesia, Hongkong, China: Kiangsi, Shantung, Chekiang, Fukien, Kwangtung, Yunnan, Kuikiang.

Dryopteris repentula (Clarke MSS.) Christ, Not. Syst. 1. 39, (1909); Matthew 366, (1911).

Rhizomes much branched, thick as a raven's quill, black, long-creeping, densely radicose, tomentose, base of the stipe usually sparcely clothed in subulate, lacerate, dark-brown scales 3 mm. long, young stipes conspicuously seriate, 2 cm. long. Fronds remote. Stipes stratous at base, pal lucid upward, terte, 1.5 cm. thick, flexuous, 20-30 cm. long, lamina oblong, acuminate, base scarcely narrowed, 20 cm. long, 5 cm. broad, bipinnatifid; pinnae about 20 on each side under the apex, remote, sessile, base dilated, equal 4 cm. long, 1 cm. broad, shortly acuminate, pectinate-incised, to a narrow wing; segments about 15 on each side, the lower ones almost free, confert, lanceolate, subacute, subcrenulate at base, veins 6 on each side, simple, oblique; sori 5-6 on each side, minute, brown, indusium small, reniform, light brown, black peltate; texture rigid, papery, color brown or grayish-green, turning opaque, on drying the lower surface and rachis minutely puberulous.

Pagoda Anthowage, India, Khasia, Japan, Hongkong, China: Kwangtung, Yunnan, Kiangsu - Shanghai.

A species widely distributed in China and northern India, in habit very closely allied to D. beddomei, but differs in fronds not attenuate towards the base and without auricles on the stipe, which are very slender and long; rhizomes long-creeping. It is also sometimes considered as D. gracilescens Bl. sometimes as D. thelypteris A. Gray. the former, however, has a stiff stipe castaneous brown, the segments much broader, dark green and the indusium broad and persistent, while the laters of a more herbaceous texture, broader segment, forked veinlets, and thickest stipes.

Dryopteris rufostraminea (Christ.) C. Chr. Ind. 290, (1905); Matthew 366, (1911).

Aspidium rufostramineum Christ., Bull. Soc. Fr. 52. Mem. 1. 36, (1905).
Nemesteum rufostramineum Lev., 1915.

Stipes glabrous, lucid, angular, 42 cm. long, ochraceous, rachis plane on both the upper and lower sides, and like costa shaded rufo-stramineous lamina 40 cm. long, 18 cm. broad, ovate, acuminate, not attenuate towards the base; pinnae close, 2½ cm. distant, the lower ones deflexed, subopposite, erecto-patent, falcate, sessile, acuminate, 11 cm. long, 2 cm. broad, cut down almost to the costa into about 25 segments on each side which are broad at base, elongate-triangular, base 4 mm. broad, rather acute, 1 cm. long, margin subentire scarcely serrulate, sinuses acute; rachis and costa smooth; veins free, simple hidden, about 9 on each side of the costule, both surfaces very shortly pubescent; sori 6-8 on each side, medial, contiguous, rounded, 1 to 1½ mm. broad, ochraceous; receptacle covered with whitish dense rigid hairs; sporangia concealed in the hairs; indusium minute, fugacious.

Kweichow.

Dryopteris clarkei (Baker) O. Ktze, Rev. Gen. Pl. 2. 812, (1891); Matthew 361, (1911).

Nephrodium clarkei Baker, HKBK. 497.

Short stipes and rachis densely clothed with firm spreading linear brown-black scales; fronds lanceolate, bipinnate, narrowed gradually from the middle to both ends, 30-60 cm. long, 7.5-12.5 cm. broad; pinnae sessile the central ones 5-6.2 cm. long, 1.2-1.6 cm. broad, cut down to the rachis below into close truncate entire spreading lobes 3-4 mm. broad, the base subequal or rather dilated, the lower reduced very gradually to mere auricles; texture subcoriaceous, surfaces glabrous, the midribs below scaly; veins distinct, 5-6-jugate, forked low down; sori supramedial; indusium firm, glabrous, persistent.

Sikkim, Formosa, China: Szechwan - Omei Shan.

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Dryopteris filix-mas. (L.) Schott, Gen. Fil ad. t. 9, (1861); Matthew 362, (1911).

Polypodium filix-mas L., 1753.
Aspidium filix-mas Sw., 1801, Mett. n. 129; Christ 256.
Polypodium elongatum Ait., 1789.
Nephrodium filix-mas Rich, 1801, HKBL. 272, 498; NPL. 173.

Stipes tufted, 15 cm. or more long more or less densely clothed with lanceolate scales; fronds 60-90 cm. long, 20-30 cm. broad; pinnae lanceolate, 10-15 cm. long, 1.8-2.1 cm. broad, cut down very nearly to the rachis into close blunt, rather subentire lobes, 3-4 mm. broad, lower ones rather shorter than the others; texture herbaceous; rachis more or less scaly, under surface naked; lower veinlets subpinnate; indusium large, convex.

Throughout Europe and Asia from Lapland to Japan, Hongkong, China: Yunnan, Kwangtung, Shensi, Kansu, Szechwan, Hupeh, Kiangsi, Manchuria.

This species has many geographical forms considered by different authorities either as distinct species or as mere varieties of the type.

Dryopteris filix-mas Schott. subspec. *fibrillosa* (Clarke) C. Chr. Medd. Got. Bot. Tradg. I. 57, (1924).

Nephrodium filix-mas Schott. var. fibrillosa Clarke, Tr. Linn. Soc. Bot. I. 520. t. 70. 1880.
Dryopteris fibrillosa Hand.-Mzt., Akad. Anz. d. Akad. Wiss. Wien. 49, 1922.
Nephrodium clarkei Baker var. fibrillosum (Clarke) Hand.-Mzt., Symb. Sinic. IV. 24. 1929.

In cutting and size this subspecies much resembles smaller plants of true D. filix-mas Schott., but the lamina more gradually narrowed towards the base. The scales on the rhizome and very base of the stipes are castaneous, long, broadly lanceolate, dense, entire, those of the stipes and rachis smaller, patent, nearly black, glossy generally very dense, lanceolate, entire or distantly and shortly fimbriate, besides with these scales, the brown rachis, the midribs of the pinnae and the whole under surface of the lamina are clothed with small hair-like, light brown fibrils, the larger of which have a broad long-fimbriate base. Stipes 2.5-8 cm. long; fronds 20-110 cm. long, very narrowly tapering at both ends, but not attenuated with auricled into the stipes; pinnae patent, cut down to the midrib; segments oblong, obtuse, serrulate at the apex.

N. India, Yunnan, Szechwan.

Contrary to the views as held by C. Christensen, Handel-Mazzetti has considered this subspecies as a form of *D. clarkei* rather than *D. filix-mas*.

Var. *elongata* (Wall. et Grev.) Baker, in HBBk. 272.

Nephrodium elongatum Hk. et Grev., Ic. Fil. t. 234.

Frond sometimes 1-1.33 m. long, 60 cm. broad, subdeltoid, quadripinnatifid, lower pinnae 30 cm. or more long, 10-15 cm. broad; pinnules close, lanceolate, cut~~s~~ down nearly to the rachis into oblong crenate lobes; involucre 0.7-1 mm. broad.

Manchuria.

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Var. *khasiana* Clarke, Tr. Linn. Soc. II. Bot. 1. 519 t. 69 f. 1. (1880).

Aspidium patentissimum Franch., Nouv. Arch. Mus. II. 10, 10. 183, 1887.

Stipe and main rachis with many linear blackish scales; frond oblong-lanceolate, very little narrowed at base; pinnae approximate, patent, the lowest equal-sided, cut down to the midrib; secondary pinnae narrowly oblong, very close and regular, glabrous beneath, rounded, finely serrulate at the apex; sori not large.

N. India, Tibet, Central China.

Var. *nidus* Clarke; Baker in HBBk. 499, (1874); Matthew 562, (1911).

Nephrodium indusium Clarke, 1873.
Nephrodium pandium Hope, 1899.

Differs from Dryopteris filix-mas var. odontoloma (Bedd.) in stipe forming dense circular tufted; frond lanceolate, bipinnate; stipe and rachis densely scaly; pinnae lanceolate, 1.8 cm. broad; pinnules blunt, ligulate-oblong, deeply inciso-crenate, 4-5 mm. broad; sori 6-8 to a pinnules, distant, medial.

India, China: Yunnan.

Var. panda Clarke, Tr. Linn. Soc. II. Bot. 1. 519 t. 68. f. 1. (1880).

Nephrodium panda Hope, Journ. Bomb. Nat. Hist. Soc. 12. 623, 1899.

Stipe round, firm; frond nearly glabrous beneath, the main rhachis with a few ovate scales; frond narrowly oblong, the lowest pair of pinnae but one often as long as any above, the lowest pinnae usually but little shorter; pinnae pinnatifid 1/3-2/3 the way of the midrib; segments subspinulose, serrulate.

N. India, Central China.

Var. normalis Clarke, Tr. Linn. Soc. II. Bot. 1. 519 t. 68 f. 2, (1880); Christ in Bull. Geogr. Bot. Man. XX. 6, (1910).

Stipe and main rhachis very sparsely scaly, without hairs or fibrillae; frond oblong-lanceolate or ovate-lanceolate, the lowest pinnae often nearly or quite the largest, nearly, nearly or quite glabrous beneath; pinnae falcate, cut down nearly or quite to the midrib, lowest pinnae unequal-side, having the pinnules of the lower limb more developed; segments usually sharply serrulate; sori small for D. filix-mas.

N. India, Korea, China: Yunnan.

Var. rosthornii (Diels) C. Chr. Medd. Got. Bot. Tradg. I. 59, (1924).

Nephrodium rosthornii Diels, Engl. Jahrb. 29. 190, (1900).
Dryopteris xanthomelas Christ, Bull. Geogr. Bot. Mans. 117. 1906.
Dryopteris filix-mas Schott. var. omeiensis Christ., l. c. xvi. 117. 1906.

Stipes 10-12 cm. long, clothed at base in linear, very long, brown paleae, upper stipes, rachis, costa and costules are more or less densely clad in smaller bristle paleae, which are dark-lustreous, spreading; fronds 30-45 cm. long, 10-15 cm. broad, oblong, diminishing towards the base, narrow, membranaceous, pale-green-pinnae 15-25 on

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side, horizontally patent, pinnatifid nearly down to costa into narrow lanceolate oblong pinnules, lower ones 5.7 cm. long, 1.5 cm. broad, middle ones 7.5 cm. long, 2.5 cm. broad, pinnules almost rounded at the apex with margin crenulato-dentate, 1-1.5 cm. long, 5 mm. broad; veins forked; sori seriate on veinlets; indusium orbicular, brownish-red confined to the upper part of the frond, as in D. lacera

Yunnan: Moupine; Szechwan - Omei Shan.

Intermediate between subspec. fibrillosa and var. khasiana Clarke, the scales of the rachis are coalblack, narrow lanceolate and fimbriate, underside slightly fibrillose with brown hairlike fibrils.

Dryopteris flaccida (Bl.) O. Ktze, Rev. Gen. Pl. 2. 812, (1891); Matthew 332, (1911).

Aspidium flaccidum Bl., Enum. 161, 1828.
Nephrodium flaccidum Hk., 1862; HkBk. 274; WrL. 175.
Christella flaccida Lev., 1915.

Stipes tufted, 30 cm. or more long, slender, stramineous, naked fronds 30-45 cm. long, 15-20 cm. broad; pinnae 7.5-10 cm. long, 2.5 cm. broad, cut down to the rachis with a narrow distinct wing into oblong lobes 4 mm. broad, cut about half way down; lower pinnae distant, shorter than the others and deflexed, texture herbaceous; the stramineous rachis and under sides villose; veinlets forked or in the lower lobes subpinnate; sori about midway between the edge and midrib.

N. India, Ceylon, Java, Korea, China: Kweichow, Yunnan.

Dryopteris grisea (Baker) O. Ktze, Rev. Gen. Pl. 2. 812, (1891).

Nephrodium griseum Baker, HKBk. 271.
Lastrea grisea Bedd., 1870.

Stipes firm, erect, grey, villose upwards; fronds 45-60 cm. long, 20-25 cm. broad, oblong-lanceolate; pinnae close, 7.5-10 cm. long, 1.8-2.1 cm. broad, narrowed gradually from the base to the apex, cut down nearly to the rachis into blunt, entire lobes 4 mm. broad, with recurved edges; texture subcoriaceous; rachis villose and veins beneath slightly so; veinlets about 10 on. a side, mostly forked; sori small, submarginal, indusium ciliated.

Hindostan, Cochin-China, China.

Dryopteris lichiangensis (Wright) C. Chr. Ind. Suppl. 34, (1913).

Nephrodium lichiangense C. H. Wright, Kew. Bull. 267, (1909).

Plants densely tufted; caudex thick; fronds, oblong-lanceolate, 25-38 cm. long, pinnate; stipes 7 cm. long, beset with lanceolate or ovato-acuminate scales; rachis similar to the stipes. Pinnae narrowly deltoid, 15 cm. long, with base 7 mm. broad, the basal ones smaller, upper ones pinnately lobed, scaly lobes acutely serrate, sometimes mucronate; veins often unifurcate; sori usually near costa, uniseriate; indusium pale stramineous, thin membraneous.

Yunnan.

Dryopteris macarthyi (Baker) C. Chr. Ind. 278, (1905): Matthew 364, (1911).

Nephrodium macarthyi Baker, 1891.
Nephrodium pubeulum Baker, JoB. 201, 1875, (non 1874).

Stipes 22-30 cm. long, slender, stramineous, scaleless; lamina lanceolate, bipinnate, 20-25 cm. long, 10-12.5 cm. broad, pinnae moderately close, lanceolate, the lowest not reduced, the 4-5 lower pairs subequal, 5-6.2 cm. long, 1.8 cm. broad at the middle, much less at the sessile truncate base, cut down to the rachis or a narrow wing into rather ascending toothed blunt lobes 2 mm. broad, veins fine distinct, 8-9-jugate in the pinnules, forked; texture thin, membranous; both sides especially the lower finely pilose; sori crowded on the forking of the veins near the edge than the midrib, 12-20 to a pinnule; indusium minute, evanescent.

Kiangsi - Kiukiang.

Most resembles the Indian *Dryopteris flaccidum* but a much smaller plant with well developed pinnules often entire and the teeth at most as broad as deep, round or deltoid.

Dryopteris monticola (Makino) C. Chr. Ind. 278 (1905).

Nephrodium monticola Makino, Bot. Mag. Tokyo 13. 80. 1899.

Caudex thick, oblique. Stipes caespitose, stout, thick, herbaceous, rufo-stramineous, scaly throughout, but denser towards the base, shorter than the frond; scales; basal ones oblong-lanceolate, to linear-lanceolate, acuminate, entire, firmly membranaceous, shining, castaneous-brown, pellucid towards the margin, with very closely finely and longitudinally arranged areolae, largest ones 24 mm. long, 6 mm. broad; upper ones smaller than the basal ones, linear-lanceolate, acuminate, entire, rufous, thinly membranaceous. Frond ovate-oblong or narrowly oblong, rather abruptly and shortly acuminate, herbaceous, bipinnatifid, 37-60 cm. long, 23-29 cm. broad, naked above, dispersed with small deltoid-ovate acuminate rufous thinly membranaceous scales along the rachis of pinnae and costa of

pinnules; rachis slender, herbaceous, rufo-stramineous, covered with ovate-lanceolate or narrowly deltoid entire often crispate thinly membranaceous rufous scales; pinnae about 12-18 on each side, the middle ones largest, spreading or erecto-patent, alternate or subopposite, moderately close, very shortly petiolate, lanceolate, acuminate, cut nearly down to the stramineous and slender rachis where forming a very narrow wing on both sides of them but pinnatifid at the apex, largest ones about 19 cm. long, 4 cm. broad; pinnules numerous, regularly arranged, spreading, narrowly oblong, obtuse, with an acute point, serrato-lobed with a cuspidate tip and often a sharpe teeth, but sharpely tipped serrate in the superior ones, broadly adnate to the rachis-wing, but the lower ones more or less abruptly reduced into an obtuse base, largest ones 2½ cm long, ¾ cm. broad; veins erecto-patent, flexuose, pinnate with 1 to 4 veinlets; veinlets free, loose, mostly simple or bifurcate. Sori in 2 series near the costa of the pinnules, solitary and dorsal on the lower part of an upper lowest veinlets, 1 to 16 to a pinnule, a little remote from one another, distinct, orbicular; indusium orbicular, with a close and deep sinus, subcoriaceous-membranaceous, entire, about 1½ mm. across.

In general habit, the species has a resemblance to *Dryopteris goldieanum* (Hooker) C. Chr. from N. America, being intermediate between *D. erythrosora* and *D. filix-mas*.

Korea, Japan, China: Szechwan.

Dryopteris odontoloma Moore, Ind. 90, (1858); C. Chr. Medd. Göt. Bot. Trädg. I. 59, (1924).

Dryopteris filix-mas Schott. var. odontoloma C. Chr., Ind. 265. 1906.

Nephrodium odontoloma Hope, Journ. Bomb. Nat. Hist. Soc. 14; 736. t. 31. 1903.

Dryopteris juxtaposita Christ, Bull. Geogr. Bot. Mans. 158. 1907.

Nephrodium filix-mas Schott. var. odontoloma Bk., HKBK. 498.

Stipes 15 cm. long, soft, thick, chestnut-coloured, with scattered deciduous lax lanceolate scales; fronds up to 65 cm. long, 15-20 cm. broad, oblong-lanceolate scales; fronds up to 65 cm. long, 15-20 cm. broad, oblong-lanceolate, truncate at the base; pinnae often widened at the base, bipinnate or tripinnatifid; pinnae distant, deltoid, the lowest pinnules much the largest, elliptical-oblong, pinnatifid (sometimes deeply), segments rounded, sharpely serrate; texture thin, becoming hyaline towards the margin; veins subflabellate. Sori 6-8 to a pinnule, distant, medial, indusium fimbriate.

India, China: Kweichow, Yunnan, Szechwan.

A distinct and rather uniform species, not closely related to D. filix-mas, but come near to D. sublacera, from which it differs (1) by the scales; those of the rhizome and of the very base of the stipes are long, lanceolate, tapering in a long hairlike tip, golden brown, entire; similar ones but smaller are found on the stipe upwards, but generally hidden by large ovate-lanceolate, blackish-castaneous scales, numerous near the base of the stipes, becoming sparcely upwards; scales of the pale stramineous rachis few, light-brown, hair-like, thin, and mostly quite entire; surfaces of the blade are practically without scales, at most a few hairlike ones are found on the midrib of pinnae beneath; (2) by the lamina being more ovate-lanceolate, with lower pinnae generally very distant, not reduced, the secondary pinnules generally free but connate to the midrib of the pinna, often rather acute at apex, lobed or serrulate, lobes nearly quadrate and with 1-2 pairs of lower pinnae sterile, sori rather small --- C. Christensen.

Dryopteris oreopteris (Ehrh) Maxon, Proc. U. S. Nat. Museum, 23, (1901); Matthew 364, (1911).

Polypodium oreopteris Ehrh., Willd. Prod. 292, 1787; Ehrh. in Beitr. 4. 44. 1789.
Aspidium oreopteris Sw., 1801; Mett. n. 266; Christ. 256.
Nephrodium montanum Baker, 1867, SKEN. 271; HTPL. 137.

Stipes short, tufted; frond 45-60 cm. long, 15-20 cm. broad; pinnae 7.5-10 cm. long, 2.5 cm. broad at the base, cut down to a broadly winged rachis into close blunt, oblong lobes; lower pinnae distant, and gradually dwarfed down to mere auricles; texture herbaceous rachis naked, or slightly scaly below, under surface glandular; lower veins forked; sori in rows near the edge.

Europe, North America, Asia; Japan, Korea, North China.

Dryopteris sericea C. Chr. Bot. Gaz. 46. No. 4, (1913).

Rhizome? Stipes close together, gray, glabrous, to 10 cm. long, clothed at the base in thin ovate-acuminate entire dense scales. Fronds ovate-oblong, 25 cm. long, 10-12 cm. broad, gradually attenuate and pinnatifid towards the apex, base rounded, texture thick, darkish, (when dry) brown above, gray beneath, both surfaces covered with very short articulate hairs which are deciduous when the fronds become old, bipinnatifid or rather subbipinnate; rachis grayish-stramineous, sulcate
(P. 120).
above, clothed underneath with minute brown sparse scales. Pinnae 7-12 pairs, ascending, alternate, the lower 4-5 pairs shortly petiolate, the upper ones sessile, broad-oblong, the largest up to 6 cm. long, 2-2.5 cm. broad; slightly broader on the posterior side of the base, often unequalateral, shortly acuminate towards the apex or not rarely obtusely serrate and gradually attenuate

from the middle upward, pinnules in the base of the lower pinnae free, with cordate base and auriculate on both sides, the auricles shortly obtuse, otherwise they are unequal, 1.5 cm. long 5 mm. broad, the lower base decurrent, the upper auriculate, margin crenate or sometimes lobed, the upper ones cut to a wing 1 mm. broad, very obtuse. Veins forked or bi-forked, 6-8-jugated. Sori medial; indusium reniform, reddish, subglabrous, persistent. Sporangia glabrous.

Shensi - Sian Fu in Tsin-ling Range.

Dryopteris subsageniacea (Christ) C. Chr. Ind. Suppl. 40, (1913),

Aspidium subsageniaceum Christ, Bull. Geogr. Bot. Man. 240 c. fig. 1906.

Rhizomes oblique, thick and like stipes clothed in lanceolate subulate black sparse scales almost 1 cm. long; rachis also clad in similar but minute and setaceous sparse scales; stipes slender, castaneous, terete, 25 cm. long; frond 30 cm. long, 7 cm. broad, deltoid-ovate, acuminate, pinnate, pinnae about 7 on each side, lobed below the apex, 5 - 4½, 3 cm. apart from the base upwards to one-third of the frond, petiolate, the upper ones broadly adnate with a wing 1½ cm. broad, decurrent; pinnae opposite, patent, the lower ones broadly semideltoid from the base, strongly broadened on the posterior side, the rest oblong, abruptly acuminated on the anterior side of the base, 10½ cm. long, 3½ cm. broad at base, deeply lobed down to the middle into about 12 segments; sinuses almost none, confert, ovate, subacute, 1-2 cm. long, 8-12 mm. broad, crenate; lower lobes on the posterior side of the pinnae 5 cm. long, 2 cm. broad, about 8 on each side; and with conspicuously ascending, costules veins in lobes 7 or 8 on each side, flexuous, forked from the middle, soriferous on the anterior veinlet which springing from costa often many times furcate and united in sinuses; sori about 7 on each side, medial, minute, lobes uniseriate on lobes; indusium small, inconspicuous; both surfaces opaque, scarcely puberulous, color green, texture herbaceous.

Kweichow.

Dryopteris syrmatica (Willd.) O. Ktze Rev. Gen. Pl. 2. 813, (1891).

Aspidium syrmaticum Willd., Sp. 5. 257. 1810; Christ 255.
Nephrodium syrmaticum Desv., 1827, HkBk. 278, HkF. 175.
Lastrea syrmatica Moore, 1858.
Nephrodium spectabile Hooker, 1862.

Rhizomes erect, densely clothed with entire, lanceolate scales stipes tufted 30-60 cm. long, scaly at the base, otherwise naked, stramineous; fronds 1-1.5 m. long, 30-45 cm. broad, cut down to a broadly winged rachis into slightly toothed lobes, 4-6 mm. broad, the lower ones stalked, the lowest not much reduced; texture subcoriaceous; rachis and both surfaces naked; veinlets 12-15 on a side, nearly all forked; sori nearer the edge than

the midrib.

India, Malaya, Philippines, China: Kwangtung, Yunnan.

(P. 125).
Dryopteris thelypteris (L.) A. Gray, Man. ed. 1. 630, (1848); Matthew 368, (1911).

Acrostichum thelypteris L., 1753.
Thelypteris palustris Schott, 1834.
Nephrodium thelypteris Strempel., 1822; HKSK. 271; HSYL. 172.

[illegible], wide-creeping; stipes about 30 cm. long, slender, stramineous; fronds 30-60 cm. long, 10-15 cm. broad; pinnae spreading, remote 5-7.5 cm. long, 1.2 cm. broad at base cut down very nearly to the rachis into entire spreading linear-oblong, deltoid-oblong mucronate-tipped lobes, those of the barren frond the broadest; lower pinnae slightly shortened; upper veinlets simple, lower ones forked; texture herbaceous; rachis and both sides naked; sori small, not confluent, in rows near the recurved edge.

Europe, America, Cape Colony, Natal, Angola, New Zealand, Korea, Hongkong, China: Amur-land, Yunnan, Shantung, Chekiang, Manschuria.

Habit of D. gracilescens, but with more remote narrower pinnae cut into short deltoid mucronate-tipped lobes with reflexed margin.

1. Fronds bipinnate to tri-pinnatifid

Dryopteris boryana (Willd.) C. Chr. Ind. 255, (1905).

Lastrea boryanum Willd.
Nephrodium boryanum Baker, 1867, HKSK. 284; HSYL. 177; Matthew 369, (1911).
Nephrodium divisum Baker, 1868.

Stipes 60-90 cm. long, stramineous or brownish, deciduously scaly; fronds ample, 2-2.65 m. long, 60-90 cm. broad, lower pinnae 30-45 cm. long, 15 cm. broad, pinnules lanceolate, 7.5-10 cm. long, cut down to a winged rachis into blunt spreading more or less toothed lobes 2-3 lin. broad; texture herbaceous; rachises and under side naked; veinlets simple or forked; sori in rows near the midrib.

Java, Moulmein, Madras, Bourbon, Himalayas, China: Kweichow, Szechwan, Kiangsi, Hupeh, Yunnan.

Dryopteris cavalerii (Christ) C. Chr. Ind. 257, (1905); Matthew 381, (1911).

Aspidium cavaleriei Christ. Bull. Geogr. Bot. Man. 116, (1904).

Stipes much elongated, 10-30 cm. long, slender, rosy-stramineous, base sparcely clothed with few subulate thin scales; fronds deltoid, 14 cm. long, 9 cm. broad; pinnae few (3-5 below the pinnatifid apex) petiolate, costa, deltoid, the lower ones much the largest and deflexed, the upper pinnae unequal, falcate-oblong, base cuneate, pinnules obtuse, coarsely lobated, lobes acute, denticulate texture coriaceous, veins forked, flabellately pinnate in lobes; sori 4-5 on each, also in the lowest pinnules, the largest 2 mm. broad, rounded, brown, indusium none.

Kweichow, [illegible].

Probably a less cut form of D. sparsa.

Dryopteris cystolepidota (Miq.) C. Chr. 260 (1905); Matthew 561 (1911).

Aspidium cystolepidota Miq., Ann. Lugd. Bot. 3. 177. 1867.

Stipes about 30 cm. long, semi-terately compressed, about 3 mm. thick near the base, almost entirely glabrous, paleae usually ovate, acute, the smaller ones almost all vesiculiform. Fronds about 50 cm. long, 23 cm. broad at the base, deltoid-lanceolate, texture membranaceous coriaceous like rachis covered in convex-ventricose ovate to lanceolate smaller blackish or fuscous paleae, bipinnate under the pinnated apex. Pinnae subpatent, subsessile or sessile, about 12 on each side, subopposite, lanceolate, under the serrated apex, pinnulated, those below the middle of the frond subequal-long, 12-13 cm. long, the upper ones gradually shortened towards the very acuminate pinnatifid-serrated apex, the lower ones 6.2-5 cm. apart, the upper ones more contact, but not contiguous, pinnules 16-18 on each side, lanceolate-oblong, slightly falcate, obtuse, mucronate-crenate-serrate, the lower ones with obliquely cuneate base which is narrowed on the lower side, broadly cuneate in the upper ones, the upper most ones subconfluent, 5 mm. broad at the base, teeth much produced on the lower side, subauricled on the upper side at base teeth oblique, ovate, mucronate-acute, 8-10 on each side, glabrous above, covered on the costa below with vesiculose fuscous paleae. Veins fine, the lower 2-3 simple or the upper ones bifurcate; sori biseriate, subequal-distant between the costa and margin, one to each tooth particularly to the upper ones, moderately rounded; indusium subcarnose entire, orbicular.

[illegible], China:

Very near D. erythrosora (Hooker).

Dryopteris erythrosora var. *obtusa* Makino, Bot. Mag. Tokyo 13, 79 (1899).

Stipes slender, hard, scaly throughout but densely clothed towards the base with rufo-castaneous or dark-brown subulate-lanceolate to subulate-linear acuminate scales. Frond deltoid-ovate or ovate-oblong, acuminate, bipinnate, subcoriaceous, naked, above, sparringly covered with small vesiculose acuminate rufous scales towards the rachis of the pinnae and costa of pinnules beneath; main rachis slender, dispersed with rufous or darkish rufous linear scales; pinnae spreading, triangular-lanceolate, or lanceolate, often falcate, acuminate, pinnate, but pinnatifid at the apex, shortly petiolate, not close, alternate or subopposite; pinnules ovate-oblong, often slightly falcate, obtuse or rounded-obtuse at the apex, truncate, subcordate-truncate, or obtuse-truncate at the base, but adnate in the superior ones, crenato-serrate, often pinnatifid into obtuse and ovate lobes in the lower ones, the both lowest lobes usually larger than the rest, the largest ones about 3½ cm. long, 1½ cm. broad. Sori close, when mature confluent, in 2 rows near the costa of the pinnules and often also in 2 rows on the lower lobes.

Japan, China:

Dryopteris erythrosora (Eat) O. Ktze, Rev. Gen. pl. 2. 812, (1891); Matthew 362, (1911).

Aspidium erythrosorum Eat., Perry, Narr. Exp. to China 2. 230, 1856 (Christ 259).
Nephrodium erythrosorum Hooker, 1862, HKBK. 273; NPFL. 173.
Aspidium prolificum Maximum, 1879.
Nephrodium prolificum Diels, 1899, NPFL. 173 (f. monstr.).

(F. 125).
Aspidium labordei Christ, Bull. Soc. Fr. 52 Mem. 30. 1905.
Dryopteris labordei C. Chr., Ind. 273, 1905; Matthew 363. 1911.

Stipes tufted, 15-23 cm. long, more or less densely clothed with membraneous long lanceolate and linear scales 1.5-2 cm. long; fronds 30-45 cm. long, 20-30 cm. broad, ovate, ovate-lanceolate; pinnae lanceolate, the lowest the largest 12.5-15 cm. long, 3.7 cm. broad, the edge slightly sometimes spinosely toothed; texture firm but herbaceous, both sides naked; rachis slightly scaly; sori in rows of 6-9 to a pinnule, near the midrib; induclum 1 mm. broad, flat, brightly red when young.

Japan, Corea, Luzon, Hongkong, China: Shensi, Shansi, Kansu, Anhwei, Chekiang, Fukien, Kiangsi, Kweichow, Yunnan, Kwangtung.

Intermediate in appearance between *Dryopteris varia* O. Ktze. and *D. filix-mas* Schott.

Dryopteris fructuosa (Christ.) C. Chr. Ind. 267, (1906); Matthew 362, (1911).

Aspidium varium var. fructuosum Christ, Bull. Boiss. vi. 967. 1898.
Aspidium fructusum Christ, Bull. Soc. Fr. 52. Mem. 1. 38, (1905).
Dryopteris basisora Christ, Not. Syst. i. 44. 1909.
Dryopteris cavalerii Lev., C. Chr., in Lev. Cat. Pl. Yunnan 104. 1916.
Dryopteris adenorachis C. Chr., Ind. Suppl. 13. 1913-1916.
Aspidium spinulosum var. patuloides Christ, Bull. Soc. Fr. 52. Mem. 41. 1906.

Stipes strong, thick as a swan's quill, like rachis and costa rufo-stramineous, 30-40 cm. long, cylindrical, and like rachis and ~~b~~ costa clothed with numerous patent subulate-lanceolate dark-brown scales to ½ cm. long, closed with puntiform cicatrices; the base of the rachis densely covered with large broad ovate-acute dark-brown dense scales 1 cm. long, ½ cm. broad, Lamina tripinnatifid, 50 cm. long, 30 cm. broad, ovate acuminate, scarcely attenuated towards base; pinnae alternate, about 20 on each side of the rachis, the lower ones remote (the interstices 8-10 cm. wide), subsessile, deltoid-ovate, 7-10 cm. broad at the base, acute; pinnules about 15 on each side of the costa, sessile, confert, often imbricate, broader at base, broadly ovate-oblong, obtuse, or subacute, 5 cm. long, 2 cm. broad at base, incised up to or over the middle of the margin into imbricate rounded-obtuse lobes, ½ cm. long, about 9 under the serrated apex, margin minutely and densely serrato-dentate, the teeth acute, subaristate; veins manifeste, pinnate in lobes (about 5 on each side of the costule) forked; sori globose, close to the costules placed singly, rarely 2 to a lobe, large, 2 mm. broad, indusium persistent, orbicular, reniform, though hard, dark castaneous, convex; texture coriaceous, surfaces lucid, light green.

Yunnan, Szechwan.

Intermediate between D. sublacera and D. marginata (Wall.); it resembles the former in the shortly and sparcely ciliate or sometimes entire scales, but the leaves are generally larger, more deltoid in outline and the fully developed ones tripinnate, secondary and tertiary segments obtuse with several acute teeth, texture stiff, colour pale-green and much larger sori which are not confined to the upper pinnae, even the basal ones sometimes soriferous, red-brown, and, as a rule, one at the base of each tertiary segment. D. marginata is less rigid in texture, often quadripinnatifid with obtuse teeth, scales different, sori smaller, etc.

(F. 126).
Dryopteris giraldii (Christ.) C. Chr. Journ. Wash. Acad. Sci. 17. 19, 500, (1927); Matthew 362, (1911).

Asplenium filix-mas var. giraldii, Nouvo. Giorn. Bot. Ital. n. s. 4: 94, (1897).

Rhizome probably erect or oblique. Fronds suberect, up to 75 cm. long or more; stipes stramineous, up to 35 cm. long, rather freely but deciduously paleaceous, the scales thin, pale brown, narrowly lanceolate; blade broadly deltoid-ovate, about 40 cm. long and broad, bipinnate-pinnatifid, herbaceous, pale green, delvoid of hairs, the rachis stramineous, glabrous, but more or less paleaceous, by soft pale lanceolate-liknear scales; pinnae about 10 pairs, alternate, the basal ones often a little shorter than the following, their lower side not or slightly produced; largest pinnae about 20 cm. long, 6 cm. broad, petiolate, (1 cm.), acuminate, unequal at base, the distal basal pinnule being somewhat elongate, the proximal one generally much shortened; pinnules 12-15 pairs, alternate, the larger ones short-petiolate, the upper sessile decurrent (costae sometimes alate at the base), inequalateral at base, narrowly deltoid, acuminate, about 4 cm. long, 1 cm. broad or more, pinnatifid two-third or three-fourth~~s~~ the distance to the costa, or the larger ones of the lower pinnae near pinnate; segments close, oblique, often much shortened; veins pinnate in the lobes, the ultimate ones simple, terminating in a hydathode at the base of the teeth; sori borne on the middle of the anterior basal veinlets of the segments, solitary or the larger segment solitary or the larger reniform, about 1 mm. broad, persistent glabrous, the margin slightly erose.

China: Shensi, Szechwan, Kansu - Lichen

A very common plant in the mountains of the Central China, most closely related some form or D. filixmas, but very distinct in its unequal-sided secondary pinnules. In this character it resembles D. sparsa Kuntze, but the latter differs in its much thicker texture and having teeth not nearly so sharpe.

Dryopteris gymnophylla (Baker) C. Chr. Ind. 269, (1905); Matthew 363, (1911).

Nephrodium hymnophyllum Baker, JoB. 170, (1887).

Caudex erect; stipes slender, 15-20 cm. long, pale, slightly scaly toward the base; lamina deltoid, tripinnate, 15-20 cm. long and broad, moderately firm in texture, green and glabrous on both surfaces; lower pinnae much the largest, distinctly petioled, deltoid, unequal sided, much produced on the lower side; ultimate segments oblong, erecto-patent, obtuse, 6-8 mm. long, 2-3 mm. broad; veins copiously pinnate in the segments; veinlets ascending, the lower ones forked; sori supramedial on the veins, mostly single at the base of the final segments on the upper side; inducium small, glabrous, reniform, fugacious.

Yunnan, Hupeh.

Intermediate between D. sparsum and D. subtripinnata.

Dryopteris heterolaena C. Chr. Medd. Goteb. Bot. Tradg. I. 62, t. XVII, (1924).

Rhizome not seen, stipes strictly erect, 25 cm. long about 3 mm. broad, trisulcate in the upper part, with blackish base, livid-stramineous upward, rachis subdensely paleaceous, scales mostly quite inconspicuous, ovate or ovato-acuminate, very thin, clear brown, adpressed, those on the tips adpressed, lanceolate acuminate at apex, dark-castaneous, strongly patent, 4-6 mm. long, scarcely 1 mm. broad. Lamina oblong or oblong-lanceolate, base not at all narrowed, 40-50 cm. long,
(P. 127).
15 cm. broad, thin herbaceous when young, tripinnatifid. Pinnae about 15 pairs, alternate, very shortly petiolate, oblong, acuminate, base not or scarcely dilated, 8 cm. long, 3 cm. broad, the lower ones slightly deflexed. Pinnules to 15 pairs, all sessile, base adnate, slightly decurrent below, oblong, obtuse, almost horizontally patent, 1.5 cm. long, 5-6 mm. broad, lobato-pinnatifid, segments about 5 on each side, obtuse, or subacute, entire or obscurely dentate at apex. Costa and costules densely and softly pilose above, hairs flexible, very soft, multicellulous; the under surface provided with bullate brown scales with short often blackish suddenly contracted apex. Veins in segments pinnate, mostly 5, simple, falling short from the margin, provided on both sides with regular and sparce hairs; sori borne near sinuses between lobules below at the base of anterior veinlets, inducium reniform, glabrous.

South Szechwan: Ta-shiang-ling.

Differs from Dryopteris erythrosora O. Ktze. by the presence of more numerous light brown adpressed scales on the upper side of the rachis and particularly softly pubescent costae and costules above; while the costae of D. erythrosora are glabrous and furnished with a broad furrow above. Further more, the present species differs its longer and secondary pinnules.

Dryopteris hirtosparsa Christ, Bull. Geogr. Bot. Man. (1909) Mem. XI. 176 Matthew 363, (1911).

Rhizomes strongly oblique, radicose, coma very densely clothed in lanceolate-subulate brown crisp scarious scales 1 cm. long, stipes 18 cm. long, thickened towards base, and like rachis cinnamomum-colored and clothed with lanceolate and linear subulate patent rigid dark-brown dense scales. Lamina 30 cm. long 28 cm. broad, deltoid, bipinnate, pinnae remote, about 10 on each side, petiolate, subdeltoid, acuminato-caudate, patent, the lowest ones broaden on the posterior side, 14 cm. long, 7 cm. broad, pinnules about 12 on each side, obtuso, obtuse, the 10 lower ones broadly ovate, petiolulate, base pinnate, cut deeply in the middle and above middle into about 7 lobes on each side, the lower lobes 1 cm. long, 4 mm. broad, crenato-lobulate,

muticious; veins pinnate in lobes, oblique, often forked, stratous; sori minute, placed on the interior veinlets of the lower lobes; inducium inconspicuous texture herbaceous, color light green, both surfaces glabrous.

Kweichow.

Dryopteris lacera (Thunb.) O. Ktze, Rev. Gen. Pl. 2. 812, (1891);
Matthew 364, (1911).

Polypodium lacerum Thunb., Fl. Jap. 337, 1784.
Nephrodium lacerum Baker, HKBK. 273; NPFL. 173.
Lastrea lacerum Eaton, 1858.
Aspidium filix-mas var. lacerum Christ, Farn. Erd. 237.

Stipes 10-20 cm. long, densely clothed below with large ovate-lanceolate scales; fronds 30-45 cm. long, 15-25 cm. broad, ovate-deltoid; pinnae 10-12.5 cm. long, 3.7-5 cm. broad, lanceolate; upper pinnules confluent, lowest free, lanceolate, acute, subfalcate, nearly entire, but the lower ones auricled on both sides of the base; texture subcoriaceous; rachis rather scaly, both sides naked; sori confined to the upper third of the frond, occupying nearly the whole of the contracted pinnules; inducium 1 mm. broad.

(P. 128).
Tsus-sima, Japan, Korea, China: Yunnan, Shantung, Szechwan, Hupeh, Kweichow, Chekiang, Fukien, Kiangsi.

Most closely allied to *D. erthrosora*, differs by its sori confined to the upper third somewhat contracted portion of the frond the pinnae reduced downward with oblong-lanceolate subentire pinnae of which only the lowest are free, the rest decurrent along winged costa.

Dryopteris laxa (Franch. and Sav.) C. Chr. Ind. 274, (1905);
Matthew 364, (1911).

Aspidium laxum Franch. and Sav., Enum. Pl. Jap. 2. 237, 1876, 631. 1879.
Nephrodium laxum Diels, 1900.

Rhizome.... petiole stramineous, smooth, gracile, about 12.5-15 cm. long; lamina flaccid, lustreous green, 15-20 cm. long, 16.5-20 cm. broad, ovate in outline, acuminate, very shortly pubescent; apex pinnatifid; rachis stramineous, almost imperceptibly puberulent; pinnae 8-10 on each sides, the lower ones very distant, alternate, petiolulate, the middle ones much the largest, close, sessile, all constricted at base, narrowly lanceolate, acuminate, pinnatifid all the way down to the rachis, sparcely and adpressedly setulose on the upper surface shortly hirtellate on the under surface and rachis lobes obliquely deltoid, oblong, obtuse or acute, the lower pinnae sinuate; veins free, the tertiary veins simple, forked at apice ended a little short of margin. Sori distant between margin and costules, solitary on veins; inducium

reniform with long-ciliate margin, spore pale-fuscous, muriculate.

Japan, China: Shansi, Kansu, Kiangsi.

Dryopteris lepidorachis C. Chr. Ind. 274, (1905); Matthew 364, (1911).

Polypodium rhaosorum Baker, Ann. Bot. 5. 457, (1891). New Ferns. 74.
Nephrodium rhaosurum Hand.-Mzt., Symb. Sin. iv. 24. 1929.
Dryopteris erythrosora var. cavaleriei Ros., Fedde Repert. 13; 131. 1914.
Dryopteris erythrosora subspec. chilolepis Hand.-Mzt., Sitzgsanz. Aka. Wiss. Wien. 49. 1922.

Stipes incomplete, fronds deltoid, bipinnate, rigid, glabrous, 15-20 cm. long; rachis very scaly; pinnae lanceolate, the lowest the largest, 7.5-10 cm. long, 1.8 cm. broad; segments distinct, entire, linear-oblong, 2 mm. broad, veins obscure, immersed. Sori medial, globose, confluent.

Chekiang, Hunan, Kiangsi - Kuling; Kweichow.

Most closely allied to *D. erythrosora* to which it has been considered as identical or as a variety by some authors, but differs by the presence on the stipes and rachis of extraordinarily dense, wide-spread, golden or darkish-brown flaccid, scales with unuulate margin, ovate base and long-subulate apex, which extend upward as far as half of the frond; while the scales in *D. erythrosora* are sparce, linear-lanceolate black-brown.

Dryopteris marginata (Wall.) Christ.

Nephrodium filix-mas Schott. var. marginatum Wall., Cat. n. 391; Clarke, Tr. Linn. Soc. Bot. 1. 521. t. 71. 1880.
Nephrodium marginata Hope, Journ. Bomb. Nat. Hist. Soc. 14. 740. t. 33. 1903.
Aspidium filix-mas var. elongata HK., Sp. IV. 117.
Dryopteris filix-mas Schott. var. marginata C. Chr., Ind. 265. 1906.

Fronds large, oblong- or ovate-lanceolate, not narrowed at the base, 2-3-pinnate; lowest pinnae often 30 cm. long, flacate; main and partial rachises nearly free from scales; tertiary pinnae oblong, obtuse, serrate or pinnatifid sometimes nearly to the midrib. Texture, venation and sori nearly as in *D. filix-mas*.

N. India, China: Yunnan, Szechwan,, Kweichow.

Dryopteris mariformis Ros. Fedde Repert. 13, 131, (1914).

Rhizomes erect, thick, covered at apex by lanceolate-subulate ferruginous paleae; stipes densely fasciculate, to 10 cm. long, 1 mm. thick, with densely paleaceous rachis, paleae spreading, similar to rhizomatic ones, only slightly broader, castaneous-

brown; lamina elongate, oval, lanceolate-acuminate, of herbaceous texture, blackish when dried, fibrillose on both surfaces, upper part pinnate-pinnatifid, the lower part bipinnate, to 35 cm. long, 10 cm. broad; pinnae to 30 pairs, pinnatifid below the apex, subsessile, much approximate, erect-patent, the lower ones deflexed, the middle ones much the largest to 5 cm. long, 12 mm. broad, base equal and truncate, lanceolate, shortly acuminate, very narrowly pinnatifid on both sides to the wings, the lower ones slightly decrescent, basal ones 3-4 cm. long, the upper ones pinnatifid into lobules with finely and gradually serrate apex; pinnules or lobes about 12 pairs, linear-oblong, obtuse, margin slightly crenate or lobules on the lower side of the base subdecurrent-dilated the upper slightly current-dilatate and slightly contracted, interstitices linear, 6 mm. long, 3 mm. broad, the basal ones about equal; costa paleaceous-fibrillose above, and with costule densely covered by bullato-acuminate paleae beneath; veins pinnate, lateral veinlets 3-4 pairs, simple or furcate; sori medial about 3 on each side, indusium reniform, corrugescent.

Kewichow; Pin-fa.

From Dryopteris polylepis (Franch. et Sav.) the present species differs in its scales, form of segments, etc.

Dryopteris michelii Lev. Fl. Kouy-tscheou 493, (1915).

Rachis almost naked, channelled, as long as the frond, the basal limbs triternate, the rest subtripinnate, texture coriaceous, greenish-rubescent above, pinnules lanceolate, dentate, sbbaristate.

Kweichow: Gan Chuen.

Dryopteris mollissima (Christ.) C. Chr. Ind. 278, (1905); Matthew 364, (1911).

Aspidium mollissima Christ, Bull. Boiss. 6. 968, (1898).

Close to D. setigera (Bl.) but smaller and with broader segments. Rhizomeserect, thick, hypogaeous, and like the base of stipes clothed in sululate scales; other parts covered with whitish lucid very fine patent hairs; rachis naked, rose-red, lucid. Stipes few, fasciculate, slender; stramineous, 25 cm. long, leaves oblong-deltoid, 40 cm. long, 25 cm. broad, acuminate, bipinnate; the lower pinnae gradually reduced 18 cm. long, 5 cm. broad, broadest at base, sessile, oblong, caudato-acuminate, rachis provided with a most narrow wing; pinnules broadly adnate, decurrent, oblong, close, obtuse, (P. 130).
deeply lobated; lobes parallel, contiguous, linear-oblong, 3 mm. broad, 3 mm. broad, subacute, crenulate; veins in lobes sparcely pinnate, much oblique, simple; sori uniseriate, close to the costule of pinnule near the base of lobes, minute, punctate,

flavescent, each composing of a few sporangia, inducium rather small, whitish, ½ mm. broad, irregularly reniform, evanescent; texture mollis, very thin, almost transluscent, color light green.

Yunnan.

Dryopteris oligophlebia (Baker) C. Chr. Ind. 280, (1905); Matthew 365, (1911).

Nephrodium oligophlebium Baker, JoB. 291; New Ferns 64.
Aspidium oligophlebium Christ, 1904.

Stipes slender, naked, stramineous; fronds lanceolate-deltoid, tripinnatifid, 45 cm. long, membraneous, entirely glabrous, several lower pinnae opposite, subequal, oblong-lanceolate, 10-12.5 cm. long; pinnules sessile, lanceolate, the lower cut down to a narrow wing into contiguous lobes 2 mm. broad; veins pinnate in the ultimate segments, with simple distant 3-jugated veinlets; sori submarginal, very small, inducium glabrous, fugaceous.

Formosa, Korea, China: Honan, Kiangsi, Chekiang,

Near D. setigera (BL.) in cutting, sori and evanescent inducium, differs, however, by its entirely naked lamina and rachis and fewer more distinct veinlets --- Baker.

Dryopteris ornata (Wall.) C. Chr. Ind. 281, (1905); Matthew 365, (1911).

Polypodium ornatum Wall., 1828; Bedd. Ferns S. Ind. t. 171, 1863-65.
Phegopteris ornata Fee, 1850-52; Christ 277.
Nephrodium ornatum Christ, 1895; NPFL. 177.
Nephrodium setigerum Baker, HKBK. 284.
Aspidium ornatum Christ, 1897.
Nephrodium tenericaule HK., 1862, Sp. 4. 6. 269 non Pag. 142.
Nephrodium Segigerum HK. pt. HKBK. 284.

Rhizomes creeping; stipes 30-60 cm. long, naked upward or scaly often 20-30 cm. long, 10-15 cm. broad; pinnules close, linear-lanceolate, 2.5-7.5 cm. long, 6-12 mm. broad, cut down to the rachis into close pinnatifid lobes not more than 2 mm. broad in the broadest form; texture herbaceous; main rachis straw-colored, naked, or more or less fibrillose; rachises of the pinnules and under sides finely villose; sori minute, copious, often 8-12 to a lobe; inducium very fugacious.

Australia, Japan, India, Malesia, China: Kweichow, Kiangsi, Chekiang, Fukien, Yunnan.

Dryopteris pseudovaria (Christ) C. Chr. Ind. 287, (1905).

Aspidium pseudovaria Christ, Bull. Soc. Fr. 52 Mem. I. 42, (1905).

Near to Dryopteris spinulosa and Dryopteris varia, differs from both in fronds being more broadly deltoid and segments lanceolate, pointed not rounded, stipes and rachis of matured plants provided with downy sharpe linear-subulate deciduous deep-brown scales, leaving behind projecting base upon falling the scales towards the base of the stipes much larger, ovate, subulate 2/3-2 cm. long, 2/3 cm. broad, forming a dense cushion at base, frond more elongate and almost tripinnatifid; pinnules petiolulate, segments short, ligulate, obtuse, rounded, and very distinctly dentate on the apex; the teeth sharply pointed, but
(P. 131.).
hardly aristate. Veins more prominent, forked, sori marginal, placed on the sinuses of the lobes, quite large, 1 mm. in diameter, deep brown, inducium firm, black, reniform, convex. Texture some-what coriaceous, glabrous, color obscure-green, more clear on the under surface.

Yunnan.

May be a form of *D. sublacear* or *D. fructuosa*.

Dryopteris sabaei (Franch. and Sav.) C. Chr. Ind. 290, (1905); Matthew 367, (1911).

Aspidium sabaei Franch. and Sav., Enum. Pl. Jap. 2. 259. 632, 1879.
Nephrodium sabaei Hand.-Mzt., Symb. Sinic. IV. 25. 1929.

Rhizome....; petiole castaneous, sulcate, angular thick as a raven's quill 15-20 cm. long, sparcely paleaceous, paleae pale-fulvous, ovate-lanceolate, acute; lamina rather rigid, 30 cm. or more long, 18-28 cm. broad at base, ovate or ovate triangular in outline, the lowest ones subtripinnate; rachis darkish often paleaceous at the point of insertion of the pinnae, rarely in the other parts, paleae tawny brown; pinnae 8-10 on each side, patent, the inferior ones widely remote, subopposite, shortly petiolate; the lowest deltoid, acuminate, 15 cm. long, almost 10 cm. broad at base equalateral, base subtripinnate; the secondary segments on the inferior side regularly pinnate, strongly broadened oblong, equal lateral, pinnules lanceolate, deeply pinnatifid, loes subspinnulose, apex truncate or obtuse; rachis sparcely paleaceous; venation free; venation free; veins in the ultimate segments simple or furcate; sori on the apex of lobes 1-seriate along the costa of pinnules or the costules of the lobes; inducium intense yellow, coriaceous, margin entire, reniform persistent; spores golden yellow, cristate.

Japan, China: Kansu, Yunnan, Kweichow.

Dryopteris sparsa (Ham.) O. Ktze, Rev. Gen. Pl. 2. 813, (1891); Matthew 367, (1911).

Polypodium sparsum (Ham.) msc.
Nephrodium sparsum Don., Prod. Fl. Nepal. 6. 1825; NKBK. 276, 489 (excl. var. 3 et 4); NPFL. 174.
Aspidium sparsum Spring., 1827; Christ 262.

Stipes tufted, 15-20 cm. long, scaly only toward the base, stramineous and glossy upwards; fronds 30-60 cm. long, 20-30 cm. broad, ovate lanceolate; lowest pinnae the largest, 10-15 cm. long, 3.7-8 cm. broad; lowest pinnules sometimes compound, the others lanceolate; unequalsided, pinnatifid into oblong, blunt lobes; texture firm, herbaceous; rachis naked or slightly scaly both sides naked; colour pale-green; sori usually only to each lobe near the midrib; indusium naked, flat, 2 mm. broad.

Malayan, Isles, Mauritius, N. India, Ceylon, Hongkong, China: Szechwan, Kwangtung, Kweichow, Fukien, Yunnan - Moupine.

Dryopteris splendens (Hooker) O. Ktze. Rev. Gen. Pl. 2. 813, (1891); Matthew 367, (1911).

Nephrodium splendens Hooker, HKBK. 282 HK. Sp. 4. 126. 1862. (excl. B.); NPFL. 177.
Lastrea splendens Bedd., 1865.
Aspidium sp/lendense Christ, Farn. Erd. 259.

Stipes 60-90 cm. long, stout, polished, chestnut-brown or nearly black, deciduously, scaly; fronds 1-1.33 m. long, 45-60 cm. broad; lower pinnae often 30 cm. long, 5 cm. broad, close, lanceolate; pinnules
(P. 132).
lanceolate-oblong, unequal sided, blunt, with a broad central portion uncut; texture subcoriaceous; rachis naked, chestnut brown; both sided naked; veinlets forked; sori in rows near the midrib.

Sikkim, Bootan, Malacca, China: Hupeh.

In habit this comes nearest the large compound forms of D. filixmas, but the dark-coloured polished rachis will at once distinguish it --- Hooker.

Dryopteris subelata (Baker) C. Chr. Ind. Suppl. 30, (1913).

Nephrodium subelatum Baker, Kew Bull. 11. 1906.

Rhizomes creeping, basal paleae lanceolate, dense, sordid brown; stipes 30 cm. or more long, pubescent, channelled above, sparce sparcely paleaceous below; lamina oblong, tripinnatifid, 60-90 cm. long, 30-37 cm. broad at the middle, chartaceous, green on both surfaces, costa glabrous above, pubescent all over the under surface; primary rachis pubescent, not paleaceous; pinnae sessile,

lanceolate, central ones 17-20 cm. long, 4 mm. broad, the lower ones remote and strongly reduced; veinlets simple, conspicuous, 10-12-jugated; sori medial, indusium firm, glabrous, persistent.

Yunnan.

Dryopteris sublacera Christ, Not. Syst. I. 43, (1909); Matthew 367, (1911).

Aspidium lacerum var. obtusum Christ, 1906.
Dryopteris blepharolepis C. Chr., in Lev. Cat. Pl. Yunnan 103. 1916.
Nephrodium sublacerum Hand.-Mzt., Symb. Sinic. IV. 21. 1929.

Stipes 22 cm. long, thick as a goose's quill, stramineous and like rachis and costa clothed copiously with subulate and setaceous dark brown, lanceolate scales 3-1.5 cm. long; fronds 60 cm. long, 15 cm. broad at middle, lanceolate or narrowly ovate-lanceolate, acuminate, base not narrowed, but with the basal pair of pinnae often somewhat shortened, bipinnate; pinnae about 20 on each side, altenate, remote, patent, deltoid-ovate, acuminate, 8-5 cm. long, base dilated, 32 mm. broad, the lower pinnae shortly petiolate, base sub-unequal (quite enlarged on the posterior side at base) pinnules subopposite, the lower ones free, the upper ones adnate, about 15 on each side, lobulate below the apex, the lowest ones to 8 mm. long, base ovate-subcordate, 9 mm. broad, oblong, obtuse, pectinato-confert, lobated 1/3 way down; lobes regular, rounded, 5-7 on each side, mucronato-denticulate, veins pinnate, 2-3-jugated, -simple; the uppermost one-third of the frond sori-ferous; sori mostly solitary on lobes, 5-6 to each side of a pinnale, 1 mm. broad, medial, rounded, light brown, slightly confluent; indusium gray, persistent, reniform; texture herbaceous, color light green, lower surface subfurfuraceous.

Yunnan, Szechwan.

Resembling D. lacera (Thunb.) O. Ktze. in only those pinnae near the apex of frond being fertile, but differs by the fertile portion of the leaf being more gradually connected with sterile part, i. e. the lower 5-6 pairs of pinnae, by lobed and obtuse segments and non-confluent sori. The species is also intermediate between D. lacera and D. odontoloma, different from the later by its numerous fimbriate scales of the rachis, which become roughened when the scales fall, while it is smooth in D. odontoloma.

(P. 133.)
Dryopteris submarginata Ros. Fedde Repert. 13, 132, (1914).

Rhizomes erect, clad in subulate ferruginous blackish paleae; stipes to 45 cm. long, 1[illegible] mm. thick in the middle, stramineous, like rachis sparcely covered with subulate paleae; costa slender covered with flexuous paleae and so as the costule with inflated acuminate paleoles; lamina deltoid-oblong, to 30

cm. long, 30 cm. broad, chartaceous, glabrous, bipinnate near apex, subtripinnate below; primary pinnae about 15 pairs, far apart, shortly petiolate, patent, oblong-lanceolate, acuminate the lower ones much the largest to 15 cm. long, 7 cm. broad, the pinnules in the lower pinnae remote, shortly petiolate, the basal ones close, slightly smaller, broadened on the posterior side, the middle ones about 4 cm. long, 12 mm. broad, subequal at base truncate or subcordate, deltoid-oblong, acuminate, subfalcate, incisolobate down to the costa below, segments linear-oblong, truncate, apex oblique-dentate, margin lightly serrate-crenate, with one tooth acute and particularly prominent; veins in the lobes pinnate, veinlets simple or furcate, rarely bifurcate; sori near costules, inducium reniform, corrugated.

Kweichow: Pin-fa.

Dryopteris subramosa Christ, Not. Syst. I. 42, (1909); Matthew 367, (1911).

Plant smooth, ample; stipes 20 cm. long or more, thick as a goose's quill, angular, clad in ovate acuminate scales, 5 cm. long; fronds broadly deltoid, 40 cm. long, 25 cm. broad, base not narrowed, tripinnatifid, acuminate, rachis clothed in small arid flexuous scales; pinnae erect-patent, distinctly petiolate, alternate, about 5 on each side, the lower ones (often 7 cm. apart) remote, 20 cm. long, 5-6.5 cm. broad, oblong, acuminate, not narrowed towards base, pinnate pinnules sessile, about 20 on each side below the inciso-caudate apex, confert, 3.5 cm. long, 1.5 cm. broad, base ovate, subequal, lanceolate, acuminate, deeply (the lower ones almost cut down to the costa) incised; segments about 10 on each side, imbricate-confert, sinuses none, obtuse, 3 mm. broad; sori near costule, about 3, rarely 5 to a segments, rounded, ochraceo-brown, 1 mm. broad, inducium equally broad; corrugated and gray; texture herbaceous, color yellowish-green.

N. Shensi: Si-ku-tsin-san.

Closely allied to Dryopteris ramosa (Hope) Christ, differs in smaller dimension and the confert segments of the pinnules.

Dryopteris tenuicula Matthew et Christ, Not. Syst. I. 56. (1909); Matthew 368, (1911).

Rhizomes oblique, short, brown; leaves fasciculate, but few, almost solitary; stipes 13 cm. long, very slender, 0.3 mm. thick at the middle, base incrassate, dark-brown, stramineous upward, clothed at base with ciliatesubulate brown scarious crisp scales 4-5 mm. long, smooth in other parts. Fronds deltoid-oblong, 13 cm. long, base 8.5 cm. broad, bipinnate; pinnae patent 11 on each side below the pinnatifid apex, approximate, the lower ones opposite deltoid-oblong, upper ones alternate, lanceolate, the lowest pinnae enlarged,

subsessile, 4-5 cm. long, 3 cm. broad at base, obtuse; costa very slender; pinnules about 4 on each side under the broadly incised apex, the lower ones free, almost petiolate, base subcordate, the upper ones adnate, the uppermost decurrent, the lowest ones strongly broadened on the posterior side, incised above middle, 2-5 mm. long; lobes 5 on each side, obtuse, triangular; the other pinnules crenato-lobate or crenate, ligulato-oblong; veins inconspicuous, pinnate and forked in the lobes. Sori medial, numerous, to 5 on each side in pinnules; indusium reniform, large, almostly 1 mm. broad, persistent.

(P. 134.)

Kwangtung: North river - Pei-loy.

Inhabit this species resembles *Dryopteris dryopteris* (L.) var. longula Christ from Siberia; a small plant of the group Filix-mas, but broader, remarkable for its feeble stipes and red and firm indusium.

Dryopteris varia (Sw.) O. Ktze, Rev. Gen. Pl. 2. 814, (1891).

Polystichum varium Presl., Epim. 57, (1849); NPFL. 193; C. Chr. Ind. 588. 1905. Matthew 388, (1911).

Aspidium varium Sw., 1801; Mett. n. 147; HKBK. 254; Christ 259.

Polypodium setosum Thunb., 1784.

Lastrea opaca Hooker, 1857.

Aspidium opacum Benth., 1861.

Rhizomes subrepent; stipes 15-30 cm. long, densely fibrillose below; frond 30-45 cm. long, 23-30 cm. broad, lanceolate deltoid; lower pinnae much the largest, subdeltoid, unequal-sided, 10-15 cm. long, 7.5-10 cm. broad, pinnules lanceolate, imbricate, the lowest one on the under side much larger than the others, segments oblong, blunt, faintly toothed or entire, the teeth not awned; texture subcoriaceous; both surfaces naked; rachis slightly fibrillose; sori principally in two rows near the midrib; indusium peltate or reniform.

Japan, Korea, Assam, Hongkong, Polynesia China: Shantung, Hupeh, Szechwan, Chekiang, Fukien, Kwangtung, Yunnan, Kiangsu, Manshuria.

A quite variable medium-sized fern, characterized by the lower part of the stipes and the entire length of the rachis rathered densed fibrillose with black shining or dark brown linear subulate scales, the deltoid-acuminate lower pinnae with the lowest pinnae on the lower side much the largest and pinnatifid almost down to the partial rachis; sori dark brown in two rows one on each side of the costa on pinnules, chiefly midway between the costa and margin.

Differs from *D. Aristata* (Polystichum aristatum Presl.) by shorter, broader deltoid-lanceolate (not long linear-

lanceolate) and shortly petiolate (sessile in the upper ones) pinnae; oblong-deltoid regularly pinnatifid and sessile (not petiolate) pinnules, broadly rounded (not auricled on the superior base, and larger sori one on each sinus.

Dryopteris viridescens (Baker) O. Ktze, Rev. Gen. Pl. 2. 814, (1891); Matthew 368, (1911).

Nephrodium viridescens Baker, HKBK. 275; NPFL. 173.

Stipes tufted, 30-45 cm. long, naked, polished, brownish, glossy, with a few lanceolate scales near the base; frond 45-60 cm. long, 30 cm. broad; lower pinnae the largest; pinnules oblong-lanceolate, pinnatifid with broad, blunt lobes with a few sharpe teeth, the lowest 5-7.5 cm. long, and cut down nearly to the rachis; texture herbaceous; colour bright green; rachis polished; both sides naked; sori in rows near the midribs of the pinnules; indusium 1 mm. broad, naked.

Loochoo, Japan Korea, China: Kansu, Fukien, Kweichow.

1 Fronds decompound.

Dryopteris amabilis O. Ktze. Rev. Gen. Pl. 2. 812, (1891).

Polystichum amabile J. Sm., Ferns Brit. and For. 152, (1866); C. Chr. Ind. 578. 1905; Matthew 385, (1911).
Nephrodium amabile Hand.-Mzt., Symb. Sinic. iv 26. 1929.
Aspidium amabile Blume, Enum. 165, 1828; HKBK. 254; Christ 240.
Lastrea amabilis Moore, 1858.
Aspidium rhomboideum Wall., 1828, Mett. n. 155.
Polystichum rhomboideum Schott., 1834.

Stipes scattered, 15-30 cm. long, slender, polished, slightly scaly below; fronds 30 cm. long, slender, polished, slightly scaly below; fronds 30 cm. or more long, 15-30 cm. broad, with a lanceolate terminal pinna and 3-6 lateral ones on each side, which are 15-20 cm. long, 2.5-3.7 cm. broad, the lowest sometimes slightly compound at the base segments subrhomboidal, with at least half the lower side cut away, 1.2-1.8 cm. long, 8-9 mm. broad, the upper side and outer part of the lower edge sharply sinuloso-serrated, texture subcoriaceous; rachis and both surfaces naked; lower veinlets in groups of 3-5; sori submarginal.

Nepaul, Ceylon, Malaccas, India, Formosa, Japan, Hongkong, China: Szechwan, Kiangsi, Chekiang, Fukien, Kwangtung, Anhwei, Kiangsu - Islands of Tseng Ming.

Nearest to the simpler form of Polystichum aristatum Presl. but has a long terminal pinna, with subuniform large rhomboidal segments.

Dryopteris amurensis Christ, Bull. Geogr. Bot. Man. (1909) Mem. XX. 164.

Rhizomes short, erect, radoose like stipes clothed with flaccid pale brown dark-ochraceous diaphanous entire ovate acuminate scales 1 cm. long; leaves few (1-3), fasciculate, stipes 30-40 cm. long, scarcely as thick as a raven's quill, stramineous; fronds 20 cm. long and as broad deltoid-pentagonous, bipinnate or quadripinnatifid, almost tripartite, with the lowest pinnae much elongated, opposite and petiolate; pinnae erecto-patent, about 8 under the apex, remote, the lowest ones 6 cm. apart, the upper ones 4-5 cm. apart, opposite, petiolate, the lowest ones strongly enlarged on the posterior side at base, semideltoid, acuminate, broad ovate, acuminate, 15 cm. long, 9 cm. broad; pinnules about 15 on each side, distant, the lower ones petiolate, strongly enlarged on the posterior side at the base, deflexed, 7 cm. long, 2 cm. broad, oblong; pinnules of tertiary order ovate almost subcordate at base, petiolate, 1 cm. long, [illegible] cm. broad, acute, about 12 on each side, the lowest ones with base almost cut down to the costulales on the lower side, the upper base deeply lobated, lobes about 5 on each side, pectinate, 3 mm. long, 1 cm. broad, oblong-ligulate, subdecurrent, aristato-serrate; veins in pinnules pinnate; sori numerous, medial in lobes often 2-3,2/3 mm. broad, rounded, indusium persistent, gray, elongate reniform, glabrous, rachis and costa sparingly clothed with linear pale brown paleae. Texture thin herbaceous color pale green.

Siberia, Manchuria, Sachalin, Amurland, Japan.

(P. 136).
Dryopteris aristata O. Ktze. Rev. Gen. Pl. 2. 812, (1891).

Polystichum aristatum (Forst), Presl. Tent. 83, (1836); C. Chr. 578. 1905: Matthew 385, (1911).
Polypodium aristatum Forst., Prod. 82, 1786.
Aspidium aristatum Sw. 1801, Mett. n. 107; HkBk. 225; Christ 240.
Polypodium exile Hance, 1583.

Rhizomes creeping; stipes scattered, 30-45 cm. long, clothed especially below, with linear or fibrillose brown scales; fronds 30-60 cm. long, 23-30 cm. broad; ovate-deltoid, tri- or quadripinnatifid; lower pinnae largest, 15-25 cm. long, 7.5-10 cm. broad, subdeltoid; lower pinnules much the largest, lanceolate-deltoid, 5-10 cm. long, with subdeltoid lower segments; teeth copious, aristate; texture subcoriaceous, glossy; both sur~~f~~face naked, rachis nearly so; sori small, principally in two rows near the midrib; indusium sometimes reniform.

Europe, Japan, Himalayas, Ceylon, India, Malesia, Polynesia, Norfolk Island, Samoa, China: Yunnan, Szechwan, Hupeh, Kweichow, Kiangsi, Chekiang, Fukien, Hunan.

Dryopteris crenata (Forsk.) O. Ktze. Rev. Gen. Pl. 2. 811, (1891); Matthew 561, (1911).

Polypodium crenatum Forsk., Fl. Aeg-Arab. 185, 1775.
Hypodematum onustum Kze., 1833.
Aspidium odoratum Bory., 1810.
Aspidium chrysolepis Fee, 1857.
Nephrodium crenatum Bak., 1877, NPHL. 175.
Nephrodium odoratum Baker, HKBK. 280.
Lastrea crenata Bedd., 1876.
Nephrodium Fordii Baker, JoB. XXVII, 137, 1889.

Rhizomes short creeping densely clothed with large bright brown membraneous lanceolate paleas 1.5-2 cm. long; stipes 10-15 cm. long, slender, flexuouse, stramineous, scaleless, glabrous; fronds fragile, membraneous, pale green, slightly pubescent, deltoid, 4-pinnatifid or 4-pinnate, 15-20 cm. long and broad; pinnae deltoid 6-12 on each side the lowest much the largest and much produced on the lower side, the upper ones gradually attenuate; ultimate segments oblong, crenato-pinnatifid, cut away on the lower side at the base; veins free, distinct, erecto-patent, one running into each final lobe; sori medial; dorsal on the final veinlets; inducium pale, reniform, membraneous, persistent.

Formosa, China: Kwangtung, Szechwan, Hupeh, Yunnan, Anhwei, Kiangsu, Kiangsu, Shensi.

Dryopteris blinii Leveille, Fl. Kouy-tscheou 490, (1915).

Allied to Dryopteris crenata, but differs in segments strongly acute at apex; sori brown, rhizometic scales lanceolate-laneur, elongate, 2 cm. long, strongly aristate, mixed with fibrous rootlets to 2 cm. long.

Kweichow; Pin-Fa.

Dryopteris caryifolia (Ktze.) C. Chr. Medd. Göt. Bot. Trädg. I. 64, (1924).

Blystichum caryifolium C. Chr., Ind. 70, (1905); 580, (1906); Matthew 385, (1911).
Aspidium curvifolium Kze., Bot. Zeit. 285, 1848 (err. typ.).
Aspidium caryifolium Kze., 1851 (non Baker 1868).
Aspidium coniifolium Wall., 1828, Mett. n. 157; Christ 240.
Polystichum coniifolium Presl., 1836; NPPL. 195.
Lastrea coniifolia Moore, 1857.
Nephrodium coniifolium Hope, 1903.
Aspidium aristatum B. Coniifolium Bk., BKVK. 255.

Near Polystichum aristatum, Presl., but the rachirome erect, the scale long, lonear-anceolate; stipes tufted, the base clothed with narrow blackish scales; fronds large, 6-75 cm. long or shorter, 4-5-pinnate; ultimate pinnules and

segments small, less coriaceous, ovate or rhomboidal, aristate; sori large or small, indusium peltate, sometimes reniform.

Asutralia, N. India, Malesia, Polynesia, Hawaii, Japan Formosa, China: Kweichow Yunnan, Szechoan, Hupeh.

Dryopteris diffracta (Baker) C. Chr. Ind. 262, (1905); Matthew 361 (1911).

Nephrodium diffractum Baker, Kew. Bull. 230, 1898.
Aspidium diffractum Christ, 1899.

Basal paleae large, lanceolate, erect, rather firm, brown; lamina deltoid, decomposite, 37-45 cm. long, moderate firm, green and glabrous on both surfaces, primary rachis slender, stramineous, naked, strongly flexuous; the lower larger than the rest, deltoid, deflexed, distinctly petiolate the lower side laterally produced, ultimate segments ovate, obtuse, base cuneat on lower side, veins sparce, simple, distinct, lateral veinlets ascending; stipes naked, slender, 30 cm. long; sori small, globose, placed near the base of the ultimate lobes; indusium small, rather green, glabrous, persistent, reniform.

Yunnan, Kweichow.

Dryopteris dissecta Fors9.) O. Ktze. Rev. Gen. Pl. 2. 812, (1891); Matthew 361, (1911).

Polypodium dissecta Forst., Prod. 81. 1786.
Nephrodium dissectum Desv., 1827, HKBK 283; HGL. 175.
Nephrodium membranifolium Hk., HKBK. (pt.) 282, 1862.
Aspidium dissectum Christ, 1898.

Stipes tufted, 30 cm. or more long, rather slender, glossy, with linear dark brown scales towards the base; fronds 30-40 cm. long, 20-45 cm. broad, deltoid; lower pinnae varying from simple ~~p~~ pinnatifid with broad blunt lobes, to 30 cm. long, with similar pinnatifid pinnules, the center usually uncut for a breadth of 6-12 mm. and the uncut bluntish or acute ultimate divisions as broad; colour bright green; texture papyraceo-herbaceous; rachis and both sides nearly naked; sori copious, generally submarginal; indusium flat, 1-1.5 mm. broad.

N. India, Philippines, Samoa, Ceylon, S. W. Australia, Madagascar, China: Yunnan.

Dryopteris fargesii (Christ) C. Chr. Ind. 264, (1905); Matthew 362, (1911).

Aspidium fargesii Christ, Bull. Soc. Fr. 52. Mém. 1. 42, (1905).

stipes much thickened at base, clothed sparingly with lanceolate pale brown reddish golden-yellow scales [illegible] cm. broad, 30-40 cm. long, rachis clothed with few smaller scales, otherwise the entire plant glabrous or subfurfuraceous; lamina broadly deltoid; pinnae long petiolate (4 cm. long), about 15 on each side under the pinnatifid apex; pin-
(P. 138).
nules 6 cm. or more broad, the lower ones petiolulate, broadly ovate-oblong, acuminate, the tertiary pinnules lanceolate, subsessile with unequal base, i. e. broaden on the anterior base; the segments in the lower part of pinnules free, cuneate, obtuse, [illegible] cm. long, ovate, lobated, lobes 3-4 on each side of the costule, denticulate; texture flaccid, light green, veins pinnate in segments, single in lobes with in crassate tip; sori placed on the margin of the sinuses of the lobes; numerous, globose, brown, scarcely 1 mm. broad, indusium thin, reniform, pale.

Szechwan, Yunnan.

Dryopteris hendersoni (Bedd.) C. Chr. Ind. 270, (1905); Matthew 363, (1911).

Lastrea hendersoni Bedd., Ferns. Br. Ind. Suppl. 17 t. 377, (1876).
Aspidium spectabiles Wall., 1828, non Blume 1828; HK. Sp. 115.
Nephrodium hendersoni Clarke, Tr. Linn. Soc. II. Bot. 1. 526, 1880.
Lastrea spectabile Bedd., 1883.

stipes 30-45 cm. long and with the rachis purple-colored and furnished with patent linear subulate reddish-brown scales; fronds 2/3-1.33 m. long, more than 30 cm. broad, subdeltoid, tripinnate with the tertiary pinnules deeply pinnatifid, and their segments again crenated or serrated, lowest pinnae largest, deltoid, unequal-sided, the two lower basal secondary pinnae largest, being much produced; texture moderately firm, the costa of the pinnules and veins of the segments sparingly furnished with long week setae most copicucus on the upper side, otherwise glabrous. Sori medial on the upper basal veinlets of the segments; indusium reniform, fugaceous.

India China: Yunnan, Kweichow, New to China.

Dryopteris matsumurae (Makino) C. Chr. Ind. 277 (1905).

Aspidium matsumurae Makino, 1891 (nomen).
Nephrodium matsumurae Makino, Bot. Mag. Tokyo 13. 64. 1899; Hand.-Mazt. Symb. Sinic. VI. 25. 1929.
Aspidium maximowiczianum Miq., Ann. Mus. Lugd. Bot. III. 178. 1867 (non).
Nephrodium maximowiczianum Baker in Syn. Fil. 499. 1874.

Dryopteris maximowiczianum C. Chr., Medd. Goteb. Bot. Tradg. I. 63. 1924.

Caudex stout, short, repent, densely rooting. Stipes tufted, long, shorter than the frond, 22-28 cm. long, ferruginous-brown, densely clothed with patent or more less reflexed persistent scales throughout; scales ovate-lanceolate to lanceolate, acuminate, entire, with very fine narrow-oblong areolae, white below and light brown above, but entirely brown when dried, the largest one about 15 mm. long, 5 mm. broad. Frond ample, deltoid, or narrowly deltoid or ovate, acuminate, tripinnasect or quadripinnatifid, thinly and firmly herbaceous, sparingly pilose on both surfaces, light green but olivaceous-brown or ferruginous-stramineous, rather densely covered with linear to lanceolate patent persistent scales, but hairy above; pinnae spreading, alternate, 12 on each side, oblong-lanceolate, acuminate truncate or subtruncate at the base, shortly petioled, the largest one 25 cm. long, 8 cm. broad, rachis slender, hairy throughout, and paleaceous-scaly below; pinnules numerous, patent, moderately close, oblong, obtuse at the apex, truncate at the base, very shortly petiolate or sessile, pinnatisected or bipin-
(P. 139).
natifid, but pinnatifid in superior ones, with fibrillose medveins the largest one 6½ cm. long, 2½ cm. broad; segments spreading, regularly arranged, moderately close, oblong, rounded or truncate-obtuse at the apex, mostly pauci-crenate, or nearly entire, or pinnatifid when well developed, The largest one 15 mm. long, 6 mm. wide, costa more or less hairy; veinlets erecto-patent, loose, all free, simple, or bifurcate, or pinnate with a few veinules. Sori each dorsal on a veinlet, generally 1-4 or sometimes 5-9 to a segment, in two rows midway between margin and costa of the segments, orbicular-reniform; indusium orbicularreniform with a deep sinus, smaller than the sori, thin membranaceous, light-brown towards the centre, papillose-ciliated on the margin.

Japan, China: Yunnan, Kweichow somewhat near Indian D. pulvinulifera (Bedd.). O. Ktze.

Dryopteris maximowiczii O. Ktze, Rev. Gen. Pl. 2. 813, (1891).

Nephrodium maximowiczii Baker, HKBK. 499.
Lastrea maximosxiczii Moore, 1881.
Aspidium commutatum Franch. et Sav., 1876.

Stipes 15-20 cm. long, castaneous, glossy with scattered lanceolate scales throughout; frond deltoid, 30 cm. long, quadripinnatifid; rachis stramineous; lower pinnae much largest, long-stalked, produced on the lower side, the others lanceolate-cuneate, truncate on lower side at base; final lobes rhomboid-oblong, unequal-sided, 3-6 mm. broad, dentate; texture membraneous; surfaces green, glabrous; venules erecto-

patent; sori small, placed just below final sinuses; inducium glabrous, persistent.

Japan, Korea, China: Yunnan, Kweichow.

Dryopteris miqueliana (Maxim.) C. Chr., Ind. 278, (1905); Matthew 364, (1911).

Aspidium miqueliana Maxim.; Fronach and Sav. in Enum. Pl. Jap. 2. 240. 1876, 634, 1879.
Nephrodium miqueliana Yabe, 1903.

Rhizome....; stipes short, 20-25 cm. long, rufescens, deeply channelled above terte below, closed with narrow deciduous paleae; lamina 30 cm. long, triangular, under surface sparcely pilose, pale green; texture soft transluscent; rachis and upper costa smooth below, rufecent at base, the upper side stramineous-green, clothed in minute linear sparce paleae with denticulate margin; pinnae patent, erect, alternate, petiolate, 13-15 on each side, subremote, the supreme ones much confluent, the lower ones 20 cm. long, 10 cm. broad at the base, quadripinnate, pinnules rather long petiolate except those on the lower side of the pinnae, which are sessile and twice as large as those on the upper side, lanceolate; the tertiary segments and quadri-segments obovate, obtuse, deeply pinnatifid, lobes ovate, inciso-serrate, obtuse; veinlets free; the lowest veins in the ultimate division furcate, the upper ones simple; sori terminal on the veinlets, submarginal or near sinuses, inducium reniform, firm, margin entire, spores mucriculate or cristate.

Japan, Korea, China: Manchuria, Yunnan, Hunan.

Dryopteris rhodolepis (Clarke) C. Chr. Ind. 286, (1905); Matthew 366, (1911).

Nephrodium rhodolepis Clarke, Tr. Linn. Soc. II. Bot. I. 526 t. 72. 1880.
Aspidium intermedium Bl., Enum. 161, 1828; Christ 263 (non Willd. 1810).
Nephrodium intermedium Baker, 1867, HKBK. 284.
Nephrodium blumei Hooker, 1862 (in part.).
Lastrea intermedium Bedd., 1870.

Stipes 30-60 cm. long, stout, erect, densely clothed at the base with long bright-brown silky fibrills; fronds 15-90 cm. long, 30-45 cm. broad, subdeltoid; lower pinnae lanceolate, often 30 cm. long, 10-12.5 cm. broad; pinnules close, lanceolate, with distinct oblong-lanceolate segments with ligulate subentire lobes about 2 mm. broad; texture herbaceous, firm; rachises slightly fibrillose like the stipes, under surface naked or slightly scaly on the midribs; sori small, copious,

nearer the midrib than the edge; indusium thin, fugacious.

N. India, Ceylon, Philippinnes, Malaccas, Japan, Formosa, China: Kwangtung, Kweichow, Yunnan, Hupeh, Fukien, Szechwan - Omei Shan.

Dryopteris setigera (Bl.) O. Kze, Rev. Gen. Pl. 2. 813, (1891);
Matthew 367, (1911).

Cheilanthes setigera Bl., Enum. 138, 1828.
Polypodium tenericaule Wall., 1828.
Nephrodium setigerum Baker, HMBK. 284 (pt.); NPFL. 177.
Hypolepis setigera Hooker, 1858.
Lastrea tenericaule Moore, 1858.

Fronds 45-60 cm. high, twice pinnate, with deeply pinnatifid pinnules; the stipes glabrous, not muricate, with a few brown scales at the base; lower primary pinnae 15-20 cm. long, the upper ones passing into the pinnatifid apex, pinnae lanceolate, the longer ones 5 cm. long, the principal veins bearing a few stiff hairs; segments oblong linear; the lower ones deeply serrate, the upper short and entire. Sori 1-4 on each side of the midrib of the segments.

Japan, Tropical Australia, Formosa, Malayan Peninsula, N. India, Philippines, Polynesia, Hongkong, China Szechwan, Hupeh, Kiukiang, Fukien, Kwangtung, Hainan, Chekiang, Kweichow.

Var. calavatum Baker, Job. XIII. 201, (1875); Matthew 367, (1911).

Differing from the type by being nearly destitute of hairs on the veins.

Kiangsi.

Dryopteris speciosa (Don.) C. Chr. Medd. Got. Bot. Trädg. 1.
1. 63, (1924).

Aspidium speciosum Don, Prod. Fl. Nepal. 5, 1825.
Nephrodium speciosum Hand.-Mzt., Symb. Sinic. VI. 26. 1929.
Aspidium affine Wall., 1828. Mett. n. 104.
Aspidium aristatum var. affine Wall., Cat. 370; Clarke in Ferns N. Ind. 511, 1880.
Lastrea affine Bedd., Handb. 250, 1883.
Lastrea aristata var. Hamiltonii Bedd., Ferns. Br. Ind. t. 369.

Fronds 2-pinnate; secondary pinnae 2.5-3.7 cm. long, oblong, serrate or pinnatifid scarcely halfway down; sori large, not near the margin.

Very similar to *Polystichum aristatum* and mabile, but the lower pinnae less compound than in the former and often

quite similar to the upper ones; texture much more coriaceous and sori very large. Rhizomes erect and not creeping.

N. India, China: Kweichow, Yunnan, Szechwan.

Dryopteris spinulosa (Mull.) O. Ktze; Rev. Gen. Pl. 2. 813, (1891); Matthew 367, (1911).

Polypodium spinulosa Muller., Fl. dan. t. 707, 1777.
Aspidium spinnulosa Sw., 1801; Mett. n. 136; Christ 261.
Polystichum spinnulosa Lam. et DC., 1805.
Nephrodium spinnulosa Strempel, 1822 HK. K. 275 (excl. y et 0); NPIL. 174.

Stipes tufted, about 30 cm. long, sparingly clothed with ovate concolourous scales; fronds 30-45 cm. long, 15-20 cm. broad, oblong-lanceolate; lower pinnae subdeltoid, 7.5-10 cm. long, 3.7-10 cm. long, 3.7-5 cm. broad, the lowest pair about equal to the next; pinnules ovate-lanceolate, the largest about 2.5 cm. long, 1.2 cm. broad, cut down to the rachis below into cloth oblong lobes with copious aristate teeth; texture herbaceous; rachis stramineous, scarcely scaly; under surface not glandular; colour pale-green; indusium not glad-ciliated.

A cosmopolitan fern, from arctic Europe and America southward to Cape Colony, Himalayas and China Yunnan - Moupine.

May be a form of D. sparsa (Don.) which is also recorded in Yunnan.

3 Phegopteris
1. Frons simpel pinnate.

Dryopteris apicidens (Baker) C. Chr. Ind. 252, (1905); Matthew 366, (1911).

Polypodium apicidens Baker, Kew Bull. 54, (1895).

Basal paleae lanceolate, membranous, ferruginous; stipes elongated, very slender, naked, stramineous, 2-5 cm. long; fronds oblong-lanceolate, 20-30 cm. long, 7.5-15 cm. broad, bipinnatifid, moderately firm, green and glabrous on both surfaces, pinnae lanceolate, caudate, deeply pinnatifid, the lower ones not reduced, 10-12 mm. broad, shortly petiolate, veins pinnate, veinlets 6-8-jugate, simple; sori small, globose, superficial, intramarginal.

Yunnan.

Dryopteris aristulata Ros. Fedd. Repert. 13, 132, (1914).

Nephrodium aristulatum Hand.-Mzt., Symb. Sinic. VI. 23. 1929.

Rhizomes short, creeping or erect, paleae about 4 mm. long, flaccid, membraneous, brown, narrowly linear, fibrillose-acuminate; stipes fasciculate, erect, slender, clad with shining black paleae near the base, stramineous and naked upward, to 30 cm. long, 2 mm. thick; lamina linear-oblong, acuminate, to 35 cm. long, 10 cm. broad, rather rigid, yellowish upon drying, pinnato-pinnatifid; pinnae about 20-pairs, the lower ones opposite, shortly petiolate, the upper ones alternate, sessile, suberect, subdistant (the lower ones 4-5 cm. far apart), those below the middle are much the largest, to 6 cm. long 1 cm. broad, slightly dilated at base, subauriculate on the upper side of the base, lanceolate, acuminate, the lowest ones scarcely shorter, the lower and middle ones pinnatifid almost down to the costa but less deeply incised upperward under a subentire apex about 3 cm. long, lobes linear, obtuse, suboblique, the lower side of the base subdecurrent the upper and lower side of the base serrate, aristately crenato-dentate in the outer margin, the base of lobes pinnate inlobes, the lateral veinlets simple, and often furcate in the upper side of the base, 4-5 on each side; sori medial, rounded or the lower ones suboblong, exindusiate.

(P. 142.).

Kweichow - Yun-lin-chow; Yunnan.

Resembling Dryopteris filix-mas (L.) in outline of lamina and form of segments, but differs by longer pinnae with longer point and the sori.

Dryopteris brainaeoides (Baker) C. Chr. Ind. 255, (1905); Matthew 360, (1911).

Polypodium brainaeoides Baker, JoB. XXVI, 229, 1888.
Nephrodium brainaeoides Diels, 1899, NPFL. 171.

Lamina very large, oblong, bipinnate, 45 cm. broad, moderately firm in texture, green and glabrous on both surfaces; rachis quadrangular; not paleaceous; central pinnae lanceolate, nearly a foot long, 3-3.5 cm. broad, cut down nearly or quite to the rachis into linear-oblong entire segments 4 mm. broad, veins simple, about 20 on a side; sori costal, confluent.

Szechwan - Omei shan: Kwangtung, Shensi, Kweichow, Yunnan.

Very near Dryopteris decussata (L.) of Tropical American.

Dryopteris brunnea (Wall.) C. Chr. Ind. 255, (1905); Matthew 360, (1911).

Polypodium brunneum Wall., List n. 333. 1828.
Polypodium distans Don., 1825, [illegible]. 308.
Phegopteris distans Mett., n. 25. 1858; Christ 274.
Nephrodium distans Diels, NPFL. 170. 1899.

Aspidium distans Christ, 1902.
Lastrea microstegia Bedd., 1885.
Dryopteris hirtirhachis C. Chr., Ind. Suppl. II. 15. 1916.
Dryopteris christii Lev., Fl. Kouytscheou 491. 1915; C. Chr. in Lev. Cat. Pl. Yunnan 104. 1916 (C. Chr. 1905.).
Nephrodium brunneum Hand.-Mzt., Symb. Sinic. IV. 21. 1929.

Stipes 45-60 cm. long, slender, glossy, stramineous or chestnut-brown; fronds 45-90 cm. long, 20-30 cm. or more broad, lower pinnae 15-20 cm. long, 3.7 cm. broad, with blunt or acute teeth or subentire lobes, the bases dilated; texture herbaceous, rachis subnaked or shortly hairy, glossy, straw-coloured or brown, under side slightly hairy; veinlets slightly pinnate in the lower lobes, pellucid; sori scattered, copious.

West India, Ceylon, Java, Formosa, Loochoo, China: Kweichow, Yunnan, Szechwan, Hupeh.

A very variable plant, receiving a number of names. D. hirtirhachis C. Chr. said to be found upon a plant from Kweichow with densely bristled sporangia and densely shortly hairy rachis, which characters are, according to Handel-Mazzetti (in Symbolae Sinicae IV. 21. 1929) also found in Indian type.

Dryopteris crinigera (Baker) C. Chr. Ind. Suppl. 31, (1913).

Polypodium crinitum Baker, Kew Bull. 12, 1906.

Caudex erect; basal paleae lanceolate, dense, large, membranaceous, brown; stipes pale, 23-38 cm. long, clothed with lanceolate and linear squarrose membranaceous brown dense paleae; lamina oblong-deltoid, simply pinnate, 3-38 cm. long, 23-25 cm. broad, moderate firm, green on both sides, glabrous above, minutely paleaceous beneath; rachis pale colored, densely paleaceous, sessile, serrulate on the upper margin, slightly produced towards the base on the superior side auriculate, the lower ones 11-12.5 cm. long, 1.8-2 cm. broad; veins free, sparcely pinnate; sori small, superficial, globose, 1-2-seriate between
(P. 143).
costa and margin.

Yunnan.

Dryopteris dielsii C. Chr. Ind. 262, (1905).

Polypodium stenopteron Baker, JoB. 229, 1888 (non 1886).
Phegopteris stenopteron Christ, Bull. Boiss. 6. 963, 1898.
Nephrodium stenopteron Diels, 1899, NPF. 170, (non Baker 1890).

Stipes stramineous, 15-20 cm. long, covered with only a few lanceolate brown paleae near the base, Lamina oblong-lanceolate, membranous, bipinnatifid, 45-75 cm. long, 16-20 cm. broad, green and glabrous on both surfaces; rachis stramineous not paleaceous. Pinnae lanceolate sessile, the lower 12.5-15 cm. long, 3.1-4 cm. broad, cut down to a narrow wing into oblong entire or inciso-crenate segments 6 mm. broad. Veins pinnate, opposite the lobes of the pinnules, with not more than two simple veinlets on each side; sori small, uniserial in the pinnules, subglobose, placed nearer the midrib than the margin.

Hupeh.

May be a form of *Athyrium unifurcatum* (Bak.) C. Chr. (cf. C. Chr. Medd. Göt. Bot. Trädg. 1. 75. 1924).

Dryopteris dissitifolia (Baker) C. Chr. Ind. 262. (1905); Matthew 361, (1911).

Polypodium dissitifolium Baker, Kew. Bull. 54, 1895.

Basal paleae large, lanceolate, membraneous, ferruginous; stipes naked, elongate, stramineous, 30 cm. or more long, fronds oblong-lanceolate, 45 cm. long, 12.5-15 cm. broad, bipinnatifid downward, glabrous, moderately firm, green on both sides, pinnae lanceolate, caudate, deeply pinnatifid, the lower ones not reduced, 8-10 mm. broad at the base, very shortly petiolate; pinnules oblong, dentate, veins pinnate, veinlets 5-6-jugate, simple, erecto-patent; sori marginal, confert, small, globose, superficial.

Yunnan.

Dryopteris diplazioides (Desv.) Urban. Symb. Ant. 4. 21, (1903).

Gymnogramma diplazioides Desv., Prod. 214, (1827); HKBK. 377.
Aspidium diplazioides Christ, Bull. Boiss. II. 6. 159, (1906).
Phegopteris linkiana Mett., n. 26, 1856; Christ 273.
Nephrodium linkiana Diels, 1899, NPFL. 172.

Stipes tufted, 7.5-10 cm. long, glossy, scaly below; fronds 45-60 cm. long 15-20 cm. broad, bipinnatifid; central pinnae 7.5-10 cm. long, 1.8-2.1 cm. broad, cut half to two-thirds of the way down into blunt entire lobes 4 mm. broad, the lower pinnae reduced gradually; texture herbaceous; rachis and both sides naked or slightly pilose; veins pinnate in the lobes, with 6-9 simple veinlets on each side, the sori oblong, often reaching nearly from the midrib to the margin.

Tropical America to Peru, South Brazil, China: Kweichow.

New to China.

Dryopteris duclouxii Christ, Bull. Geogr. Bot. Man. 139, (1907); Matthew 361, (1911).

Rhizomes horizontal-creeping, sulcate, thick as a swan's quill, radicose; stipes angular-sulcate, green or dark-stramineous, strong, almost as thick as a man's small finger, covered sparcely at base with brown ovate-acute flaccid scales, the upper part like rachis clothed sparingly with short whitish hairs, 55 cm. long; fronds 1½ mm. long, 35 cm. broad, acuminate, towards base gradually reduced into free auri-
(p. 144).
cules, base dilated, acute, deeply incised; pinnae acuminate, broad, sessile, the lower ones remote (interspaces 5 cm. wide) the upper ones confert, about 45 on each side between the basal auricules and the pinnatifid apex, 20 cm. long, dilated towards base, 3½ cm. broad, the lower ones with free auricules touching the rachis, auricles 1½ cm. long, ovate, prounde and almost flabellately incised (more like in Dryopteris stipularis from America) to a broad wing, segments closely pectinate, about 40 or more on each side, sinuses almost none falcate, acute, coarsely serrulate, 13 mm. long, base 5 mm. broad, costules and veins prominently whitish; veins 11 on each side, simple; sori marginal, large, 1½-2 mm. broad, globose, margin clothed in ridigid whitish hairs; texture coriaceous, the upper surface obscure green, the lower surface pale green.

Dryopteris erubescens (Wall.) C. Chr. Ind. 263, (1905); Matthew 362, (1911).

Polypodium erubescens Wall., 1828; HK. Sp. 4. 256, 1862; HK.BK. 306.
Phegopteris erubescens J. Sm., 1875; Christ 272.
Nephrodium erubescens Diels, 1899, NPFL. 171.
Aspidium erubescens Christ, 1902.

Stipes 60 cm or more long, tetragonous, glossy, stramineous, asked; fronds 1-1.33 m. long, 30-60 cm. broad; lower pinnae sometimes 30 cm. long, 3.7 cm. broad; texture rigid, subcoriaceous; rachis and both sides naked; veinlets simple, often 20 on a side, the sori close to the raised midrib.

N. India, Malesia, China: Szechwan, Yunnan, Kweichow.

Dryopteris esquirolii Christ, Bull. Geogr. Bot. Man. 144, (1907); Matthew 363, (1911).

Christella esquirolii Lev. 1915.

Ample, rachis dark-stramineous, and like costa and veins covered with short densely pubescent gray strigose hairs; pinnae numerous, close, 17 cm. long, 2 cm. broad; acuminate, sessile cut almost down to the rachis except a narrow wing 1 mm. broad, segments pectinate, about 50 on each side below the apex, sinuses narrow, acute,

segments ligualto-lanceolate rather obtuse, almost 1 cm. long, 2 mm. broad, margin subdenticulate, veins about 12, simple, sori free, not immersed, about 10 on each side, minute placed exactly midway between costa and margin, round, dark, indusium none or almost none; texture herbaceous, upper surface light green, except costa which is lighter green.

Kweichow.

Drypteris grossa (Christ) C. Chr. Ind. 269, (1905); Matthew 363, (1911).

Phegopteris grossa Christ, Bull. Boiss. 7. 13, (1899).

Large fern; rhizomes creeping, and like stipes and rachis covered sparingly with black linear-acuminate patent scales to 1 cm. long, stipes solitary, stramineous, 43 cm. long; fronds broad ovate-elongate, 45 cm. long, 20 cm. broad, simple pinnate; pinnae remote, the lower ones stand 5 cm. apart, horizontally patent, not reduced, pinnatifid under the apex into 12 lobes on each side, the lowest ones petiolulate the upper ones sessile, 10 cm. long, 1½ cm. broad, shortly truncate at base, lanceolate, acuminate, the upper ones denticulate, the middle and lower ones crenato-lobed; lobes rounded-obtuse but apiculate, lobes not incised over ½ the pinnules. Texture thinly herbaceous, color light green, leaves glabrous, costa conspicuously stramineous, veins slender not conspicuous, pinnate in lobes, simple or forked, not anastomosing,
(P. 145).
4-5 on each side of the costule; sori triseriate along costa, dorsal on veinlets, rounded, fuscous, 1 mm. in diameter, exinduciate.

Dryopteris incrassata (Christ) C. Chr. Ind. 272, (1905); Matthew 363, (1911).

Phegopteris incrassata Christ., Bull. Boiss. 6. 963, (1898);

Rhizomes thick, erect; entire plant naked; stipes fasciculated, stramineous, 20 cm. long; leaves broader at base, oblong, acuminate, 30 cm. long, 10 cm. broad, bipinnatifid, sometimes bipinnate; pinnae not decrescent. The lowest ones far apart, falcate, lanceolate-acuminate, sessile, pinnatifid to the middle or over the middle; lobes contiguous, ovate-oblong, rather obtuse, but acute and almost aristato-crenate; veins pinnate in lobes 5-7 on each side, not anastomosing, slightly conspicuous; sori submarginal, sit on the fertile veinlets with calvate and incrassate apex, brown, rounded, exindusiate; texture papery-coriaceous, color pale; both side shinning green like *D. sophoroides*.

Yunnan, Szechwan.

Dryopteris laokaiensis C. Chr. Ind. Suppl. 34, (1913).

Polypodium viscosum R. H. Wright, Kew. Bull. 12, 1906.

Stipes caespitose, ebenaceous, 10 cm. long, basal palaceae slightly subulate, lamina ovate, acuminate, pinnae, 20 cm. long, 9 mm. broad, glandulo-pilose on rachis and veins; pinnae oblong, acuminate, 6.2 cm. long, 1.8 cm. broad, light green, pinnatiparted, 2 lower ones deflexed; lobes obtuse, oblique, serrate; veins simple, rarely forked; sori often placed on both sides of the costa, broadly uniseriate.

Tonkon, Laokai,

Allied to Dryopteris obscurum Hooker, differs by ovate-glandular fronds and the serrated lobes of pinnae.

Dryopteris omeiensis (Baker) C. Chr. Ind. 280, (1905); Matthew 365, (1911).

Nephrodium omeiene Diels, 1899, NPFL. 171.
Polypodium omeiense Baker, JoB. XXVI. 229, (1888).
Dryopteris leveillei Christ, Bull. Geogr. Bot. Mans. (1909) Mem. XX 176.

Rootstock wide-creeping below the surface; stipes naked, a foot long; lamina oblong-lanceolate, bipinnatifid, a foot or more long, 10-12.5 cm. broad at the middle, reduced towards the base, moderately firm in texture, green and rather hairy on both surfaces, rachis costae and veins with whitish longer or shorter needle-like hairs auriculiform the costules above with long setae; pinnae sessile, lanceolate, caudate at apex, 7.5-10 cm. long, 1.8 cm. broad, the lower 1-3 pairs much reduced auriculiform, cut down to a narrow wing into more or less falcate entire subacute or obtuse linear-oblong segments 4 mm. broad; veinlets normally simple, distinct, 8-9 -jugated, sori small, medial, exinduciate.

Kweichow, Szechwan - Omei Shan.

Differs from the Himalayan D. appendiculatum (Wall.) by its creeping rootstock and medial sori.

Dryopteris omeiensis var. flexilis (Christ) C. Chr. Medd. Göt. Bot. Trädg. I. 54, (1924).

(P. 146).
Var. flexilis (Christ) C. Chr. Medd. Got. Bot. Tradg. I. 54, (1924).
Aspidium flexilis Christ, Bull. Geogr. Bot. Mans. 252, 1902.
Dryopteris flexilis C. Chr., Ind. 266. 1906.

Differs from the type by smaller size; blade 20 cm. long, pinnae 4-5 cm. long, 1-1.2 cm. broad, without reduced pinnae in the lower part, the lowest ones generally reflexed, stipes slender.

It closely resembles D. Gracilescens (Bl.) O. Ktze., but the latter has indusiate sori.

Szechwan, Kweichow.

Dryopteris paucinervata C. Chr. Ind. 283, (1905).

Polypodium oligophlebium Baker, HKBK. 506, 1894, (non Kze. 1850).

Stipes 30-45 cm. long, brown, slender, with a few broad blunt large scales; fronds deltoid, 45 cm. long, simply pinnate; pinnae 5-6-jugate below the pinnatifid apex, lanceolate-acuminate, shallowly and bluntly lobed, 12.5-15 cm. long, 5 cm. broad, all except the lowest more or less adnate to the rachis; texture papyraceous; surfaces green, naked; main veins erecto-patent, 1.2 cm. apart; veinlets 5-6-jugate; sori medial.

Peru, China: Kweichow, Kwangtung.

Dryopteris phegopteris (L.) C. Chr. Ind. 284, (1905); Matthew 366, (1911).

Polypodium phegopteris L., 1753, HKBK. 508.
Polystichum phegopteris Roth., 1799.
Nephrodium phegopteris Prantl., 1884; N.FL. 170.
~~Ph~~Phegopteris polypodioides Fee, 1850-52, Christ 275.

Rhizome~~s~~ slender, wide-creeping; stipes 15-23 cm. long, slender, naked except towards the base; fronds 15-23 cm. long, 10-15 cm. broad, subdeltoid, lower pinnae 5-7.5 cm. long, 1.2-1.8 cm. broad, cut down three-quarters of the way to the rachis into close, blunt, entire or slightly toothed lobes 3-4 mm. broad, the lowest pair deflexed; texture thinly herbaceous; under side slightly hairy; veinlets 6-8 on a side, the lower ones forked; sori nearer the edge than the midrib.

Europe, Arctic and Temperate America, Asia Minor, Himalayas, Japan, China: Chekiang.

Dryopteris purdomii C. Chr. Bot. Gaz. 56. No. 4, (1913).

Rhizome, stipes to 10 cm. long, stramineous, slender, bisulcate and clothed with deciduous hairs above. Fronds narrowly lanceolate, 30-35 cm. long, scarcely 5 cm. broad at the midd~~l~~le, attenuated on both sides, membraneous, bipinnatifid; rachis slender, stramineous, clothed on white, short spreading deciduous hairs, then sparcely pubescent; lower 2-3 pinnae abbreviate, 1-2 cm. long, 7 cm. apart, the middle ones much the largest, 3-4 cm. long, base 1.2-1.4 cm. broad, sessile, broader, gradually attenuated into a short acuminate apex, mostly curved, erect, the upper surface, especially near the costa and costules setulose with short spreading hairs, the

lower surface hispidate with spreading white, subdense hairs near the costa and costules, margin ciliate, pinnatifid into a wing 1 mm. broad; the laciniate segments oblique, triangular-acute, margin revolute, entire, with the upper side of the base slightly longer; veins undivided, about 5-pairs, oblique, the base of the upper margin with acute close sinuses. Sori medial, numerous, exindusiate, receptacle pilose, sporangia setose.

Shensi: Tai-pei-shan.

(P. 147).
Close to D. brunnea (Wall.) C. Chr. but differs in smaller size and its setose receptacle and sporangia.

Dryopteris otarioides (Christ) C. Chr. Ind. 282, (1905); Matthew 365, (1911).

Aspidium otarioides Christ, Bull. Geogr. Bot. Man. 247, (1902).

Stipes slender, clothed at base with sparce black setas, 52 cm. long, rufo-stramineous; fronds deltoid, ovate, 25 cm. long, base 15 cm. broad, caudato-acuminate, pinnate, the lowest pinnae equal or longer than the upper ones erect-patent, the lower ones remote, petiolulate, the upper ones close, broadly adnate, decurrent with winged rachis apex pinnatifid into broadly decurrent lobes; pinnae falcate-ovate, caudate, 9 cm. long, 2 cm. broad, the lowest ones attenuate towards base, regularly lobed to 1/3 way down, lobes ovate, lower ones obtuse, the upper acute, much larger downwards, the lower pinnae, 12 on each side below the dentate apex of the pinnae; lobes 1 mm. long and broad, confert; sinuses very acute, margin dentato-aristate, costa black, veins in lobes 4-6 on each side, conspicuous, simple, rarely jointed; sori exindusiate, densely crowded, brown, rounded, medial; not confluent, 8 to a lobe springing from costa; texture firm, papyraceous, color dark-green.

Khasia, China: Kweichow, Yunnan.

Dryopteris scallanii (Christ) C. Chr. Ind. 291, (1905).

Aspidium scallanii Christ, Bull. Soc. Bot. Ital. 296. 1901.

A small fern. Rhizome weak, erect, short, naked, provided with numerous long fibrous-roots; stipes solitary, 5 cm. long, flexuose, brownish-green, and like costa and veins densely pubescent with whitish, short, rigid hairs. Lamina lanceolate, not attenuate towards the base, long-acuminate, bifid from the middle, 14 cm. long, 4 cm. broad below the bifurcation and 2 cm. broad above, simply pinnate with the uppermost part only deeply pinnatifid, into 7 free and separate pinnae below the bifurcation and 15-20 confert ones above; pinnae 20 or 22 mm. long, 6 mm. broad, broadly lanceolate, shortly acute, the lower ones

narrowly and the upper ones broadly adnate but scarcely decurrent, the lobes in the uppermost part of the frond only cut down to a broad wing, both the pinnae and the upper lobes inciso-crenate and serrulate with acute teeth. Leaves naked above, shortly pubescent on the veins beneath, texture coriaceous, color dark-green; veins mostly forked from the middle, free. Sori large, ovate, brown, dorsal, near the costa, exinduciate, uniseriate but usually many-seriate towards the base of the pinnae and contiguous.

Szechwan.

The nearest ally to the species is probably D. decursivo-pinnata (Van Hall), which differs by lamina being strongly attenuate towards the base, by not free but narrowly decurrent pinnae, rounded small, many-seriate and induciate sori and by flaccide herbaceous texture and pale green color of the fronds.

A very peculiar fern; its systematic position is uncertain.

Dryopteris serrata (Cav.) C. Chr. Ind. 291, (1905).

Meniscium serratum Cav., Descripc.548, 1803; MKBK. 392.
Phegopteris serratum Mett. 1864.
Nephrodium serratum Key., 1843; NPFL. 179.
Polypodium serratum Lowe, 1858.

Stipes 1/3-1 m. long, stout, brownish, glossy; fronds 1/1.33 m. or more long, 30 cm. or more broad; pinnae 2.5-7.5 cm. apart, 15-30 cm. long, 1.2-5 cm. broad, oblong lanceolate, the base cordate or cuneate, the apex acuminate, the edge finely toothed; texture subcoriaceous; both sides naked; main veins 3 mm. apart; areolas 12-20 between the midrib and edge.

Mexico, West Indies to Brazil, Peru, Hongkong, South China.

Very near D. reticulata Urban, species not yet recorded from China.

Dryopteris stenolepis (Baker) C. Chr. Ind. 294, (1905); Matthew 367, (1911).

Polypodium stenolepis Baker, Kew Bull. 231, (1898).
Aspidium Yunnanense Christ, 1898.

Lamina deltoid, 40-45 cm. long, and broad, simple pinnate, subcoriaceous, green and glabrous on both sides; rachis slender, stramineous, sub-naked, pinnae lanceolate, acuminate, denticulate, with short petioles , base rounded on both sides, the lower ones 17-20 cm. long 1.6-1.8 cm. broad; primary veins parallel towards base, veinlets simple, ascending, 3-4-jugated; stipes 30 cm. long, stramineous, naked, clad upward in very large linear subulate, dark-brown scales towards the base; sori small, globose, superficial, 3-4-paired, loosely placed.

Yunnan.

Dryopteris subthelypteris (Christ) C. Chr. Ind. 296, (1905).

Aspidium melanorhizum Christ, Bull. Soc. Bot. Ital. 196, (1901).

Rhizome branching, short-creeping, black lanceolate scales 3 mm. long; stipes few or solitary, glabrous or very shortly verrucose (plant glabrous), slender, stramineous, blackish at the base, 15-20 cm. long. fronds 20 cm. long, strongly acuminate, deltoid from the base, bipinnatisect 7 cm. broad; pinnae confert, pinnatifid below the apex, about 10 on each side of the rachis, 4.5 cm. long, 8 mm. broad, almost sessile, lanceolate-acuminate, cut down the costa into falcate, subacute lobes, 2.5 mm. broad, almost entire or very slightly denticulate, with inflexed margin; veins simple, free, prominent; sori medial, minute, exinduciate; texture thin coriaceous, color dark-green.

Szechwan.

Closely allied to D. the-lypteroides, differs by larger size, coriaceous, texture, exinduciate sori, and very slightly subdenticulate margin of ultimate lobes. D. thelypteroides has long creeping rhizome, flaccide herbaceous, texture and marginal induciate sori.

Evidently closely allied to or perhapes identical with D. omeiensis C. Chr.

Dryopteris subobscura (Christ) C. Chr. Ind. 296, (1905).

Phegopteris subobscura Christ, Bull. Boiss. 6. 836. 1898.

Rhizome short, erect, densely radicose, stipes fasciculate, numerous, 8 cm. long, weak and like rachis fusco-atratous, strongly hispidate with patent very narrow hairs, 3 mm. long. Leaves oblong, deltoid at base, long acuminate, 10-14 cm. long, base 4 cm. broad, bipinnatifid, the lowest pinnae much the largest, deltoid-ovate, shortly petiolate, the upper ones sessile, ovate, the apex of the frond simple, pinnatifid. Pinnae obtusish the lowest pinnate towards the base are deeply lobed, the lowest lobes incised, the others entire, falcato-lanceolate, obtusish or shortly acuminate, glabrous, obscurely green,

(P. 149).

paperaceo-membranaceous. Veins conspicuously black, 4-pinnate in the inferior lobes, furcate in the upper ones, free towards margin, non-incrassate at apex. Sori inconspicuous, minutely punctiform, dorsal or subterminal on veinlets, away from costule, often submarginal on the upper part of the frond, indusia destitute or with a rudimentary minute deformed base.

Sumatra, China: Yunnan.

1 Fronds bipinnate

Dryopteris amaurophylla (Christ) C. Chr. Ind. 251, (1905); Matthew 360 (1911).

Phegopteris amaurophylla Christ, Bull. Boiss. 7. 14, (1899).

Large fern, caudex.....; plant 120 cm. long, 20 cm. broad, stipes firm ovate obtuse scales [illegible] cm. long; with reduced pinnae far apart towards the base, rachis and whole plant covered in dense hairs. Fronds 2-pinnate under the pinnatifid apex pinnae numerous, almost opposite, horizontally patent, 10 cm. long, 2 cm. broad, linear-lanceolate, acuminate, rather remote, sessile, incised all the way down to a broad wing; lobes 4-5 mm. broad, contiguouus, sinuses almost none, apex rounded-obtuse, almost entire or only minutely crenulate, texture firm herbaceous color dark green, veins 8-11 on each side, costulae somewhat pellucid, often furcate, free, oblique; sori small consisted of a few sporangia, brown, medial, but much more close to costa than the margin, 6-8 on each side of the costula. Indicum waing.

Yunnan.

Dryopteris blanfordii (Hope) C. Chr. Ind. 254, (1905).

Nephrodium blanfordii Hope, Journ. Bomb. Nat. Hist. Soc. 12. 248, c. fig. 1902.

Plants isolated, caudex suberect; stipes in a tufte, generally short, wiry, densely clothed at the base with long narrow bright chestnut scales, and higher up with broadly, ovate, acuminate, and lanceolate-acuminate particolored scales, both sorts truncate at base. Fronds 30-60 cm. long, 15-30 cm. broad, lanceolate, truncate, though somewhat narrowed at base, bipinnate; main rachis clothed with lanceolate-acuminate particolored scales, mixed with fibrillae; secondary rachises fibrilse; pinnae about 2~~4~~5 pairs, distant, but not more so towards the base of fronds patent, linear-acuminate, broadest at the base, cut down to a narrowly winged rachis into 1[illegible]-14 pairs of sessile broad-based pinnules set widely apart, having a confluent acuminate toothed apex; pinnules oblong, bluntly rounded, divided more or less deeply into 4-6 slightly toothed lobes; texture herbaceous; costa of the pinnules undulating and branching into the lobes; veins branching into 2-4 veinlets in the lobes; sori one on each lower superior veinlet of a group, near the costa, confined to the upper part of the frond.

N. India, China: Kiangsu.

Near D. filix-mas Schott.

Dryopteris laeta C. Chr. Ind. 273, (1905); Matthew 364, (1911).

Nephrodium laeta Komarov, F. Mansh. 124, 1901; Act. Hort. Petrop. XX. 1901.

Stipes channelled, to 40 cm. long. Fronds 35-40 cm. long, lanceolate or oblong-ovate, acuminate, bipinnate; pinnae very ascendingly

(P. 150).
pointing forward; pinnules rather remote, pinnatipartite, acute, segments simple serrate, decurrent at base, all sessile, apices inclinate, rachis stramineous, subglabrous, provided only in the axils with thin paleae and pale cinnamomum hairs; texture rather rigid, but transluscent, color obscure green above, pale light green beneath. Sori ample, perfect rounded, about 1 mm. across, biseriate, substramineous, reniform, confluent upon maturity; spores cinnamomum brown, large.

Manchuria: in the vicinity of the city of Kiren.

Dryopteris lofouensis Christ, Bull. Geogr. Bot. Man. 143, (1910); Matthew 364, (1911).

Stipes deeply sulcate on the ventral side pale green or lead-reddish, nitent; glabrous, thick as a swan's quill, over 30 cm. long; fronds over 1 m. long, oblong, broadest at base, 30 cm. broad, biand almost tripinnatifid; the lower pinnae petiolate and opposite, remote, 10 cm. apart, the rest sessile, 20 cm. long, 5 cm. broad, broadly lanceolate, acuminate, cut to a wing [illegible] cm. broad, lobes 2 cm. long, 1 cm. broad, ovate, obtuse, about 20 on each side, separate by rounded upper side of the base and pinnate into lobes to 9 cm. long, lobes crenato-dentate; veins conspicuous, slender, oblique, trifurcate, free, extending to the margin; sori small, on the forking of anterior veinlets, medial, imbricate, soon evanescent, color light green, texture thinly herbaceous.

Kweichow.

Dryopteris linnaeana (L.) C. Chr. Ind. 275, (1905); Matthew 364, (1911).

Polypodium dryopteris L., 1753; HKBK. 309.
Polypodium linnaeanum Roth, 1799.
Nephrodium dryopteris Michx., 1803; NPFL. 175.
Phegopteris dryopteris Fee, 1850-52; Mett. n. l. Christ 275; Bedd. Handb. 293, f. 105.
Dryopteris dryopteris Christ, 1909, Britton, 1913.

Rhizomes slender, wide-creeping; stipes 15-30 cm. long, slender, stramineous, naked upward, slightly scaly below; fronds 15-25 cm. each way, deltoid tri-pinnate; lowest pinnae much the largest; deltoid; ultimate pinnules lanceolate, to oblong-lanceolate, only the lowest free, oblong, slightly crenate; or pinnatifid in the lowest ones into oblong; texture thinly herbaceous rachis and both sides glabrous, often glandulose veins

pinnate in the ultimate pinnae, veinlets forked or simple; sori submarginal, a little below the apex of veinlets.

Europe, temperate and artic America, Asia - Japan, Himalayas, China: Manchuria, Shansi, Shensi, Chihli, Szechwan.

Dryopteris pteridiformis Christ. Bull. Geogr. Bot. Man. 137, (1907); Matthew 366, (1911).

Ample, rhizomes horizontal, creeping, thick as a man's finger, racemose; stipes few or solitary, sulcate, almost 1 m. tall, [illegible] cm. thick, covered sparcely with rufo-castaneous, ovate and broadly lanceolate acute, brown scales but glabrous in other parts; rachis strongly dark-stramineous; fronds 75 cm. long, 40 cm. broad, deltoid-ovate, pinnae petiolate, remote, about 18 on each side under the shortly pinnatisect apex, deltoid-ovate, pinnules about 20 below the apex, close, the lowest 10 cm. long, 3½ cm. broad, petiolulate, the upperones sessile, broadly lanceolate-acute, cut down to a narrow wing; the tertiary segments ovate-oblong, very obtuse, close, the lowest ones lobulate, the
(P. 151).
others entire but minutely serrulate, the middle ones [illegible] cm. long, 3 mm. broad; veins pinnate in segments; numerous close; sori confined to the upper part of the fronds, occupying the base of segments, sometimes extending as far as the apex, 2 or 3 on each side, soon evanescent, texture subcoriaceous color paler beneath.

Yunnan.

Resembles Pteridium aquilinum in habit.

Dryopteris robertiana (Hoffm.) C. Chr. Ind. 289, (1905); Matthew 366, (1911).

Polypodium robertianum Hoffm., Deutschl. Fl. 2. 20. 1795.
Phegopteris robertianum Prantl., 1884; NPFL. 175.
Phegopteris robertiana A. Br. Aschers., 1859; Christ 276.
Gymnocarpium robertianum Newm, 1851.
Nephrodium robertianum Prantl., 1884; NPFl. 175.
Polypodium dryopteris (robertianum HK.) HKBK. 309.

Precisesly similiar to D. linnaeana in general habit, differs only thicker rhizome, somewhat stiffe stipes, smallerpinnae and smaller and often revolute segments and also by a thic golden finely glandular coating on the under side of the leaves.

Europe America, Asia; N. India, Japan, China, China: Szechwan, Hupeh, Manchuria.

1. Fronds tripinnate

Dryopteris manipurensis (Bedd.) C. Chr. Ind. 276, (1905).

Polypodium manipurensis Bedd., JCB. 235, (1888).
Phegopteris manipurensis Bedd., 1892.

Rhizome? stipe 25-30 cm. long, furnished with numerous large golden-brown broadly lanceolate acuminate scales; fronds 30-45 cm. long, deltoid-ovate, tripinnate with the tertiary pinnae pinnatifid; rachises furnished with ferruginous curled many-jointed hair-like scales, the main ones somewhat flexuous, the lowerpinnae the largest, 15-20 cm. long, ascending, secondary pinnae 2.5-5 cm. long; tertiary pinnae about 1.2 cm. long with a broad sessile base furnished with hair-like scales, similar to those on the rachises; sori small, 1-2 (rarely more) to each ultimate segments or lobes of the tertiary pinnae, medial, apical or nearly apical on the lower veins.

N. India, China. - Yunnan.

Dryopteris sphaeropteroides (Baker) C. Chr. Ind. Suppl. 111 (1906-1913).

Polypodium sphaeropteroides Baker, Bull. Kew. 1895; 55.
Aspidium sphaeropteroides Christ, Bull. Geogr. Bot. Mans. 119, 1906.

Rhizomes creeping; stipes fairly crowded elongate, stramineous, clad with brown deflexed ovate membranaceous scales near base, glabrous upward to 30 cm. long, slender; fronds large, deltoid-lanceolate, to 50 cm. long, 15 cm. broad, tripinnate, green, submembranaceous, pubescent on both surfaces when young, become glabrous when old, rachis stramineous, pinnae above 15 on each side, far apart, the lower ones 8-10 cm. apart, to 14 cm. long, 4-5 cm. broad, lanceolate, upper ones gradually shorter, sessile, pinnules about 20 on each side in lower pinnae to 2 cm. long, about 1 cm. long, oblong, sessile, pinnatifid down to costa into about 7 oblong, rounded, serrate segments; veins in segments
(P. 152).
forked or subpinnate; sori small, globose, superficial, 5-7 on each side of costa of pinnule, at the base of segments, but only 1 to each segment in the uppermost pinnae.

Yunnan, Szechwan.

A finely cut fern, resembling Cystopteris japonica in habit.

Dryopteris subtripinnata (Miq.) O. Ktze; Rev. Gen. Pl. 2. 811, (1891).

Aspidium subtripinnatum Miq., Ann. Lugd. Bat. 3. 1679, 1867.
Nephrodium subtripinnatum Baker, 1868; HKL. 174.
Nephrodium chinense Baker, 1867, HKBK. 275.
Aspidium forbesii Hance, 1875.

Caudex decumbent; stipes about 15 cm. long, slender, substramineous clothed throughout in linear dark-brown scales;

fronds 30-37 cm. long, 15-23 cm. broad, subdeltoid, quadripinnatifid; pinnae few, far apart, the lowest much the largest, deltoid 12.5-15 cm. long, 7.5-10 cm. long, 7.5-10 cm. broad; lowest-pinnules on the lower side much longer than the others, which are lanceolate, with distinct oblong-deltoid, deeply pinnatifid lower segments; texture herbaceous; rachises naked or slightly scaly, under surface almost naked; sori copious, 2/3 mm. broad, distant from the midrib.

Japan, Korea, China: Shantung - Chefoo; Chekiang, Kwangtung, Manshuria.

§ Leptogramma.

1. Fronds pinnatifid

Dryopteris gymnogrammoides (Baker) C. Chr. Ind. 269, (1905); Matthew 365 (1911).

Polypodium gymnogrammoides Baker, JoB. XXVI, 229, (1888).
Nephrodium gymnogrammoides Diels, 1899, NPFL. 170.

Rootstock creeping below the surface; stipes spaced out, slender, stramineous, naked, fragile, 10-12.5 cm. long; lamina oblong-deltoid, 12.5-15 cm. long, about 7.5 cm. broad, membraneous, green and glabrous on both surfaces, cut down to a narrow wing to the main rachis into lanceolate crenate pinnae 8 mm. broad, the lowest pair deflexed as in D. phegopteris; veins in pinnate groups, with about 2 very ascending veinlets on a side; sori oblong in a single row on each side of the midrib of the pinnae.

Kweichow, Hupeh, Szechwan - Omei Shan.

Most closely allied to D. oyamensis (Baker) C. Chr. and to which it is regarded by C. Chr. (cf. Medd. Göt. Bot. Trädg. I. 55. (1924) as a mere synonym; but for reasons as mentioned under D. oyamensis I can not help considering the Chinese species as quite distinct from the Japanese.

Dryopteris oyamensis (Baker) C. Chr. Ind. 282, (1905); Matthew 365, (1911).

Polypodium oyamensis Baker, JoB. 166, (1877).
Polypodium kramerii Franch. et Sav., 1876.
Phegopteris oyamensis Mak., 1899.
Nephrodium oyamensis Diels, 1899, NPFL. 170.
Aspidium cramerii Christ, 1905.

Rootstock slender, wide-creeping bearing a few small pale brown lanceolate scales on the exposed parts; stipes slender, naked, 5-7.5 cm. long; laminadeltoid, membranaceous, glabrous, naked, about 7.5 cm.

(P. 153).
long, simply pinnatifid, cut down to the main rachis into linear, oblong pinnae, of which the lower are the largest, deflexed, and obtusely lobed principally on the lower side; veins pinnate opposite the lobes or crenus, veinlets fine, much ascending, 2-3-jugated; sori oblong in a single row, midway between the midrib and margin of the pinnae, place on the middle of the lowest anterior veinlets of each group.

Japan - Oyama, China: Kansu, Shensi, Kweichow.

In general habit this species is closely allied to Dryopteris Gymnogrammoides (Baker) C. Chr. and can hardly be separated from the latter, except it is twice as small, of a still thinner membraneous texture, smaller sori and shorter hairy stipes. Specimen from Sining, N. Kansu, agrees in the respects very well with the Japanese type.

1. Fronds bipinnatifid to bipinnate.

Dryopteris africana (Desv.) C. Chr. Ind. 251, (1905); Matthew 360, (1911).

Polypodium africana Desv., 1826.
Polypodium tottum Willd., Sp. 5. 201, 1810.
Gymnogramma totta Schlecht., 1825, HKBK. 376.
Gymnogramma lowei HK. et Grev., 1829.
Grammitis blumeana Presl., 1836.
Phegopteris africana Mett., n. 31, 1858; Christ 272.
Aspidium africanum Engl., 1892.
Nephrodium africanum Diels, NPFL. 170, 1899.

Rhizomes decumbent; stipes subtufted, 15-30 cm. long, slightly scaly below; fronds 30-45 cm. long, 15-25 cm. broad, bipinnatifid; pinnae lanceolate, 7.5-12.5 cm. long, 1.8-2.5 cm. broad, with blunt entire lobes 3.7-5 cm. broad which reach about halfway down; texture herbaceous; rachis and both side finely villose; veinlets pinnate in the lobes, with 5-6 veinlets on a side, with the linear-oblong medial sori.

Cape Colony, Guinea Coast, Azores, Abyssinia, Himalayas, India, Ceylon, Java, Japan, Corea, Hongkong.

Dryopteris aurita (Hooker) C. Chr. Ind. 255, (1905).

Gymnogramme aurita Hooker, Fl. t. 474, 989, (1854); HKBK. 377. (Christ 274.
Polypodium auritum Lowe, 1858.
Leptogramme aurita Bedd. 1883.
Aspidium auritum Christ, 1904.
Nephrodium auritum Hand.-Mzt., Symb. Sinic. IV. 11. 1929.

Rhizomes creeping; stipes 30 cm. long, naked, glossy, chestnut brown; fronds 45-60 cm. long, 12.5-30 cm. broad, bipinnatifid or bipinnate; pinnae in distant pairs, cut down nearly or quite

to the rachis into lanceolate, entire or crenate lobes, the lowest ones on one or both sides longer than the rest and pinnatifid; texture subcoriaceous; rachis glossy, castaneous; both sides naked; veinlets forked; sori oblong, sometimes prod/uced on both forks.

N. India, China: Yunnan.

Dryopteris decurrenti-alata (Hooker) C. Chr. Ind. 261, (1905).

Gymnogramma decurrenti-alata Hooker, Sp. 5. 142 t. 294, (1864); HKBK. 377.
(P. 154).
Leptogramma decurrenti-alata J. Sm., 1875.
Phegopteris decurrenti-alata Christ, 1897, Farn. Erd. 274.
Nephrodium decurrenti-alatum Diels, 1899, NPFL. 171.
Christella decurrenti-alata Lev., 1915.

Stipes 45 cm. long, brown, weak, slightly scaly downwards; fronds 45 cm. long, 30 cm. broad, subdeltoid; lower pinnae the largest, lanceolate, 15 cm. long, 5 cm. broad, cut down to the rachis below into oblong bluntly lobed pinnules; texture herbaceous; colour deep-green; rachis and both sides naked; veins pinnate in the lobes of the pinnules, with the sori near the main veins.

Japan, Formosa, China: Fukien.

Recently recorded in this country.

Dryopteris opaca (Don) C. Chr. Ind. 250, (1905); Matthew 355, (1911).

Hemionitis opaca Don, Prod. Fl. Nepal. 15, 1825.
Gymnogramma opaca Spring, 1827, HKBK. 378.
Gymnogramma obtusata Blume, 1828.
Phegopteris opaca Christ, 1897, Farn. Erd. 274.
Nephrodium opacum Diels, 1899; NPFL. 171.

Stipes 45-60 cm. long, strong, stramineous, glossy; fronds several feet long, often 60 cm. broad; lower pinnae often 30 cm. long, 15 cm. broad; pinnules close, lanceolate, cut down nearly to the rachis below into close oblong, slightly toothed lobes; texture herbaceous; rachis and both sides naked; veinlets forked; sori oblong, irregular, close to the midrib.

N. India, Java, China: Kwangtung.

§ Cyclosorus

Dryopteris cana O. Ktze., Rev. Gen. Pl. 2. 812, (1891).

Polypodium appendiculatum Wall., Catal. 349; Hooker, Fil. Exot. t. 87; HKBK. 306, (1806); Matthew 377, (1911).

Stipes tufted, about 30 cm. long, deciduously villose; fronds 45-60 cm. long, 20-25 cm. broad, ovate-lanceolate; pinnae 7.5-12.5 cm. long, 1.8-2.2 cm. broad; narrowed from the base to an acuminate point, cut down nearly to the rachis into linear oblong falcate lobes 3 mm. broad; lower pinnae with a small gland at the base, slightly reduced; texture herbaceous; rachis and lower surfaces villose; veinlets 8-12 on a side; sori close to the midrib.

Himalayan, China: Hupeh.

Dryopteris arida (Don) O. Ktze. Rev. Gen. Pl. 2. 812, (1890).

Aspidium aridum Don, Prod. Fl. Nepal. 4. 1825; Christ 247; Matthew 360, (1911).
Nephrodium aridum Baker, HKBL. 391, 1874.
Aspidium obscurum Blume, 1828.

Stipes 30 cm. or more long, erect, naked; fronds 1-1.33 m. long, 30-45 cm. broad; pinnae 15-23 cm. long, 1.8-2.5 cm. broad, cut about one third of the way down into subtriangular sharp-pointed lobes, texture coriaceous, rachis and lower surface naked or slightly hairy; veinlets 5-10 on a side; sori in rows about midway between the midrib and edge; capsule naked.

North India, Philippines, Malayan Peninsula, Formosa, South China.

(P. 155).
Dryopteris brachyodus (Kze.) O. Ktze. Rev. Gen. Pl. 2. 812, (1891); Matthew 360, (1911).

Polypodium brachyodus Kze., Linn. 9. 48, 1834.
Nephrodium brachyodus Hooker, 1862, HKBL. 295; Christ 248.
Phegopteris seemanni J. Sm., 1854.

Stipes tufted, 30-60 cm. long, greyish, naked; fronds 60-90 cm. long, 30-45 cm. broad; pinnae 15-23 cm. long, 3.7-4.2 cm. broad, cut from one-third to half the way down into blunt, oblong slightly falcate lobes lower pinnae not much smaller than the others; texture coriaceous; rachis and both surfaces naked; veins pinnate in the lobes, with 10-15 veinlets on a side, with a sori on each about midrib and edge; indusium small and fugacious.

India, Costa Rica, Malesia, Peru, Galapagos, China: Kweichow, new to China.

Dryopteris extensa (Bl.) O. Ktz. Rev. Gen. Pl. 2. 812, (1891).

Aspidium extensum Blume, Enum. 150, 1828; Christ 247.
Aspidium continenuren Mett., 1858.
Nephrodium extusum Moore, 1858, HKBL. 289; NPF. 178.
Cleandra cumingii J. Sm., JOB. 3. 411, 1841; HKBF. 303.

Stipes 30-60 cm. long, naked or slightly pubescent, brownish; fronds 2/3-1.33 m. long, 30-45 cm. broad; pinnae 15-23 cm. long, 1.5-1.9 cm. broad, cut about two-thirds down to the rachis into linear-oblong lobes; lower pinnae scarcely shorter than the rest; texture papyraceous, herbaceous; under surface naked or slightly villose; veinlets 6-8 on a side, often only the lowest pair united; sori in rows, nearly terminal on the veins and not confined to the lobes.

Assam, Philippines, Malaya, India, Ceylon, Birma-Malesia, Hongkong, China: Kwangtung.

Dryopteris gongylodes (Schkuhr) O. Ktze. Rev. Gen. Pl. 2. 811, (1891); Matthew 363, (1911).

Aspidium gonggilodus Schkuhr., Kr. Gew. 1. 193 t. 33 c. 1809; Mett. n. 241.
Nephrodium unitum R. Br., 1834; HKBS. 289; NPBL. 178.
Aspidium unitum Mett., 1864; Christ 248.

Caudex very long, creeping; fronds subcoriaceous, 30-60 cm. long, glabrous rather glossy above, densely tomentose beneath pinnate; pinnae numerous, shortly petiolate, 7.5-12.5 cm. long, 6-12 mm. or more broad, linear lanceolate, acute rather than acuminate, sometimes broader and cuneate at the base, pinnatifid 1/3 or ½ down to the costa, veinlets curved, one or two of the lowest opposite pair united; sori near the middle of the veins or submarginal, sometimes confined to the lobes, sometimes extending to the disk and not unfrequently forming a continuous intramarginal line following the courses of sinues, the whole length of the pinnae, indusium reniform, setose.

Australia, N. India, Polynesia, Malesia, North Zealand, Formosa, Loochoo, Korea, Hongkong, China: Hainan, Kwangtung.

Dryopteris heterocarpa (Blume) O. Ktze. Rev. Gen. Pl. 2. 813, (1891); Matthew 363, (1911).

Aspidium heterocarpum Blume, Enum. 155, 1828.
Aspidium dimorphum Kze., 1848.
Nephrodium heterocarpum Moore, 1856.

(F. 156).
Rhizome firm, wide-creeping, the stipes 7.5-10 cm. long, firm, erect; fronds 30-60 cm. long, 3.2 cm. broad, entire, narrowed to both ends very gradually; texture firm; both sides naked; main veins distinct to the edge; areolae copious, with free veinlets; sori in rows of 3-6 near the main veins.

N. India, Ceylong, Malesia, Java, Borneo to Philippine, Hongkong, China: Kwangtung, Fukien.

Dryopteris megaphylla (Mett.) C. Chr. Ind. 277, (1905).

Dryopteris megaphylla (Mett.) C. Chr. Ind. 277, (1905).

Aspidium magaphyllum Mett., Ann. Lugd. Bat. 1. 243, 1864.
Aspidium pennigerum Bl., Enum. 153, 1828.
Nephrodium pinnigerum Moore, 1858; HKBK. 292; NPFL. 179.

Stipes tufted, stout, 20-30 cm. long, finely villose; fronds 2/3-1.33 m. long, 30-45 cm. broad; pinnae numerous, spreading, 15-23 cm. long, 2.5-3.7 cm. broad, the apex acuminate, the edge cut about a quarter of the way down to the midrib into oblong falcate lobes, the lower pinnae dwarfed and distant; texture herbaceous or subcoriaceous; rachis and under surface finely villose; veinlets 6-9 on a side; sori medial; capsules setose.

India, Ceylon, Malaccas, Angola, China: Yunnan, Kweichow.

Dryopteris ochthodes (Kze.) C. Chr. Ind. 280, (1905); Matthew 365, (1911).

Aspidium ochthodes Kunze, 1851, Linn. Sp. 24. 282, 1851; Mett. n. 187.
Nephrodium ochthodes Hooker, 1862.
Nephrodium prolixum Hooker, HKBK. 268.
Nephrodium multijugum Baker, 1867, HKBK. 291.
Nephrodium punctatum Baker, 1874, HKBK. 506.
Christella ochthodes Lev., 1915.

Rhizomes short, erect, stipes, crowded, moderately long flexuose, fusco-paleaceous towards the base; rachis and costa hispidulous above and glabrous below, or hispidulous on both sides; fronds subcoriaceous, firm, glabrous, sparcely canescently hispidulous, olivaceous above, paler beneath, lanceolate acuminate, at the base gradually and long attenuated, pinnate; pinnae deeply pinnatifid, sessile with a callous gland at the base beneath, patent or from lower ones gradually dwarfed, the lowest abortive, margin more or less reflexed in fructification, the lowest segments on each side longer, distinctly but slenderly pinnatedly veined; sori either in a continuous line near the costule, one at the base of each vein, or near the centre of the veins.

N. India, Korea, China: Hainan, Kwangtung, Yunnan, Kweichow. Anhwei, Hupeh, Hunan.

Dryopteris parasitica (L.) O. Ktze. Rev. Gen. Pl. 2. 811, (1891). Matthew 364, (1911).

Polypodium parasiticum L., 1753.
Aspidium parasiticum Sw., 1801; Christ 243.
Nephrodium parasiticum Desv., 1827; NPFL. 181.
Nephrodium molle R. Br., 1810; HKBK. 293.
Nephrodium latipinnatum HK., 1867; HKBK. 292.
Polypodium nymphale Forst., 1785.
Christella parasitica Lev., 1915.

Stipes tufted, 30 cm. or more long, rather slender, deciduously hairy; fronds 30-60 cm. long, 20-30 cm. broad; pinnae spreading, 10-15 cm. long, 1.8 cm. broad, cut about halfway down to the midrib into scarcely falcate, blunt lobes, the lower pinnae distant, rather shorter
(P. 157).
than the others; texture herbaceous; rachis and sufriaces finely villose; veins pinnate in the lobes, with 6-8 veinlets on a side; sori distant from the midrib; capsules naked.

S. America, Europe, Himalaya, Hongkong, China: Fukien, Yunnan, Kiangsi, Hainan, Kwangtung.

A variable plant, in size, pubescense and arrangement of sori.

Var. amboinense C. Chr. Ind. 282, (1905).

Nephrodium amboinense Presl., 1836, HKBK. 292.

Stipes tufted, 15-20 cm. long, grayish, nearly naked; fronds 60 cm. or more long, 20-30 cm. broad; pinnae spreading, 7.5-10 cm. long, falcate lobes; lower pinnae shorter and deflexed; textre papyraceous-herbaceous; rachis and under surfaces slightly pubescent; veins pinnate in the lobes, with 4-6 veinlets on a side; sori in rows close to the midrib; capsule naked.

Philippines, N. India, Malayan Isles, Ceylon, Hongkong, China: Canton.

Differs from the type only by more papyraceous texture and parts being not so hairy or so deeply lobed.

Var. didymosora Bedd. Hando. 279, (1892); Ferns Brit. Ind. t. 200.

A large form, very hairy, the lower pinnae not at all reduced, sori twin, confined to the base of segments.

India, China: Yunnan.

Dryopteris pteroides (Retz.) O. Ktze. Rev. Gen. Pl. 2. 813, (1891); Matthew 366, (1911).

Polypodium pteroidum Retz., Obs. 6. 39. 1791.
Aspidium pteroidum Sw., 1801; Christ 247.
Nephrodium pteroidum J. Sm., 1857; HKBK. 289; HPFL. 178.
Aspidium terminans Wall., 1828.
Nephrodium terminans J. Sm., HK. 1862 (pt.).

Stipes 30-60 cm. long, slender, stramineous or grayish, slightly scaly below; fronds 2/3-1.33 m. long, or more broad; pinnae spreading, 10-20 cm. long, 1.8 cm. broad, the apex acuminate, the edge cut one-third or half way down into oblong

Himalayas, Neilgherries, Ceylon, Malaccas, Philippine, Queensland, Samoa, China: Kiangsi, Kwangsi.

Dryopteris rampans (Baker) C. Chr. Ind. 287, (1905); Matthew 366, (1911).

Nephrodium rampans Baker, JoB. XXVII, 177, (1889).

Rhizomes hypogaeous, wide creeping; stipes naked, stramineous, 15 cm. long; deeply grooved above; fronds oblong-deltoid, simple pinnate, rigidly subcoriaceous, glabrous, about 30 cm. long, 2025 cm. broad, pinnae about 17, distant, sessile, lanceolate, 12.5-15 cm. long, 1.2-1.5 cm. broad, crenate the lowest not reduced; main veins 3-4 mm. apart; veinlets 6-7-jugated; sori copious, small, subcostal; indusium minute, fugaceous.

China: Hupeh, Szechwan, Yunnan, Hunan.

Allied to *D. sopheroides* and *D. unita*.
(P. 158).
Dryopteris sinica Christ, Not. Syst. I. 38, (1909); Matthew 367, (1911).

Rhizomes horizontal-creeping, thick as a goose's quill, radicose, brown; stipes solitary clothed near base in lanceolate-subulate brown, opaque, slender, reddish-stramineous scales 5 mm. long, 40 cm. long, with shortly puberulous rachis; pinnae erecto-patent in the lower part, confert, about 25 on each side, the lower ones pinnatifid up to the apex, sessile, base dilated with anterior base imbricating upon the rachis, 13 cm. long, 2. cm. broad, incised to ¾ down to the costa; lobes about 40 on each side, 5 mm. long, 3-5 mm. broad, ovate-falcate, acute, entire; costa reddish-stramineous, with veins and both surfaces shortly pubescent; veins oblique, simple, 8-10 on each side, the lowest secondary and rarely acute sinuses; sori medial, 5-6 on each side, minute, light brown; indusium very small, 0.5 mm. broad; reniform, corrugated; texture thin papery, color light green, opaque.

Formosa, China: Yunnan.

Dryopteris sophoroides (Thunb.) O. Ktz. Rev. Gen. Pl. 2. 813, (1891); Matthew 367, (1911).

Polypodium sophoroides Thunb., 1794.
Aspidium sophoroides Sw., 1801; 1801; Christ 246.
Nephrodium sophoroides Desv., 1827; HKBK. 253; KBL. 178.
Polypodium unitum Thunb., Fl. Jap. 336. 1784. (non L. 1753).
Christella sophoroides Lev., 1915.

Stipes 20-30 cm. or more long, slender, substramineous, pubescent; fronds 30-60 cm. long, 15-25 cm. broad; pinnae spreading, 10-15 cm. long, 1.2-1.8 cm. broad, the apex acuminate, the

edge cut about one-third of the way down into oblong-triangular subfalcate lobes; texture papyraceo-herbaceous; rachis and under surface finely villose; veins pinnate in groups, with 8-10 veinlets on a side, with sori distant from the midrib; capsule naked.

Japan, Formosa, Hongkong, China: Yunnan, Hainan, Kwangtung, Szechwan - Omei Shan; Shensi, Kansu, Hupeh, Kiangsi, Chekiang, Fukien, Kweichow, Anwhei, Hunan, Kiangsu.

Dryopteris squamaestipes (Clarke) C. Chr. Ind. 294, (1905);
Matthew 367, (1911).

Polypodium appendiculatum var. squamaestipes Clarke, Tr. Linn. Soc. II. Bot. 1. 543 t. 79 f. 2. 1880.
Nephrodium auriculatum Diels, 1899; NPFL. 171.
Polypodium auriculatum Wall., 1828, HK. Sp. 4. 237, 1862; HKBK. 306.
Polypodium appendiculatum Bedd., 1868.
Aspidium appendiculatum Christ, 1908.

Stipes tufted, 45-60 cm. long, deciduously villose; fronds 1-1.33 m. long, 30 cm. or more broad, pinnae 15-20 cm. long, 2.5 cm. broad, cut down nearly to the rachis into close spreading entire blunt lobes 4-6 mm. broad, lower pinnae reduced down to mere auricles; furnished with a prominent gland at the base beneath; texture herbaceous; rachis densely villose; under side nearly naked; veinlets simple, 10-12 on side, bearing the sori about the middle.

N. India, to China: Hupeh.

Dryopteris truncata (Poir) O. Ktze. Rev. Gen. Pl. 2. 814. (1891);
Matthew 368, (1911).

Polypodium truncata Poir, Enc. 5. 534, 1804.
Polystichum truncata Gaud., 1827.
(P. 159).

Aspidium truncata Gaud, 1827; Mett. n. 254; Christ 248.
Nephrodium truncata Presl., 1836; HKBK. 294; NPFL. 161.
Aspidium caudiculatum Sieb., 1851.
Nephrodium truncata Presl., 1836.

Stipes tufted, stout, erect, 60 cm. long, grayish, naked or slightly villose; fronds 2/3-1.33 m. long, 30-45 cm. broad, pinnae 15-23 cm. long, 2.5 cm. broad, cut down one-third or more of the distance to the rachis into blunt, spreading, oblong lobes, texture papyraceo-herbaceous, lower pinnae distant, small, under surface nearly or quite naked, rachis slightly villose, veins pinnate in the lobes, with 8 sori on each side near the main veins.

Australia, India, Malesia, Polynesia, Madagascar, Mascarenae, Formosa, China: Hainan.

New to China.

Dryopteris unita (L.) O. Ktze. Rev. Gen. Pl. 2. 311, (1891).

Polypodium unitum L., 1759.
Nephrodium cuculeatum Baker, HKBK. 290, 1867.

Stipes 30 cm. long, strong, erect, brownish, nearly naked; fronds 45-60 cm. long, 20-30 cm. broad; pinnae close, 10-15 cm. long, 1.2 cm. broad, cut down one-third of the way to the rachis into triangular acute subfalcate lobes; lower pinnae dwindling down suddenly into mere auricles; texture coriaceous; rachis and lower surface densely pubescent; veins pinnate in the lobes, 8-10 veinlets on a side; sori subterminal; capsules naked.

N. India, Ceylon, Malesia, Polynesia, Mascarenae, China: Kwangtung.

Dryopteris xylodes (Kze.) Christ, Not. Syst. 1. 41, (1909).

Aspidium xylodes Kze., Linn. 24. 284, 1851.
Dryopteris ochthodes C. Chr. var. xylodes C. Chr., Ind. 280, 1906.

This species is most closely allied to D. ochthodes and with which it has frequently been confounded, but differs from its near ally by its stipe being destitute of reduced auriculiform pinnae, but provided with two rows of black glands and by its coriaceous texture.

India, China: Szechwan, Yunnan.

It is a widely dispersed species in Tropical Asia and Central China.

§ Coniopteris

Dryopteris austrosinensis Christ, Bull. Geogr. Bot. Man. 145, (1907); Matthew 300, (1911).

Ample, rachis thick as a goose's quill, greyish-brown, smooth; fronds 1 m. or more long, 27 cm. broad, pinnate under the cut acuminate apex; pinnae erecto-patent, remote, with an interspace to 3 cm. broad, numerous, sessile, the lower ones opposite, to 23 cm. long, 4 cm. broad, acuminate, cut down on both sides into a broad wing 4 mm. broad, about 25 on each side, triangular-ovate, rather obtuse, separated by narrow and obtuse sinuses, subfalcate, 8 mm. broad, 12 cm. long, minutely subcrenate, costa distinct, veins slender, pinnate in lobes, about 8 on each side, many times forked, free, but the lower ones in connivent sinuses, sori numerous, sitting on 2 or 3 forked veins in lobes, many-seriated, medial, minute, brown, exindusiate; texture thin herbaceous, color dark-green opaque, surfaces puberulous.

Kweichow.

Dryopteris granulosa (Presl.) C. Chr. Ind. 269, (1905).

Polypodium granulosum Presl., Rel. Haenk. 1. 24 t. 4 f. 2 1825.
Goniopteris granulosa Presl., 1836.

Frond 30 cm. high or more, pubescent at least on the rachis and principal veins, simply pinnate; pinnae 5-7 or sometimes more, oblong lanceolate, acuminate, slightly falcate, 10-12.5 cm. long, entire, rounded at the base and shortly petiolulate; veins very prominent, the primary ones numerous, parallel with regularly pinnate transverse veinlets meeting in an intermediate line. Sori at the junction of the veinlets in single row between each two primary veins or more frequently in a double rows.

Ceylon, India, Luzon, Malayan Peninsula, northward to Chusan, Hongkong.

One or two of its peltate scales intermixed with the sori occasionally persistent a long time has been mistaken for the indusium of Aspidium.

Dryopteris moulmeinensis (Bedd.) C. Chr. Ind. 278, (1905).

Nephrodium moulmeinense Bedd., Ferns Brit. Ind. Correct. 1870 (nomen); (H.BF. 303); RFBI. 175.
Polypodium multilineatum Wall., HKBK. Sp. 5. 11. 1863; HKBK. 316.
Goniopteris multilineata Bedd., 1867.
Phegopteris mucronata O. Ktze., 1891.
Aspidium multilineatum Christ, 1897, Farn. Erd. 249.
Christella moulmeinensis Lev., 1915.

Rhizomes stout, woody, the scales large, ovate, bright ferruginous; stipes 30 cm. or more long, erect, glossy; fronds 45-60 cm. long, 30 cm. or more broad; pinnae in pairs 2.5-5 cm. apart, 15-20 cm. long, 2.5-3.7 cm. broad, the apex acuminate, the edge thickened and wavy, the base rounded; texture subcoriaceous; both sides naked; main veins distinct to the edge; areolae copious, hidden, with free veinlets; sori large, one between each main vein, forming a row nearer the midrib than the edge.

N. India, China: Yunnan, Hupeh, Kweichow.

Dryopteris penangiana (Hooker) C. Chr. Ind. 283, (1905); Matthew 365 (1911).

Polypodium penangianum Hooker, Sp. 5. 13, 1863.
Polypodium lineatum Colebr., Wall. 1828; Hk. Sp. 5. 12. 1863; HKBK. 316.
Goniopteris lineata Bedd., 1867.
Dryopteris pseudo cuspidata Christ, Bot. Gaz. 51; 357 1911.
Polypodium lineatum Coleb., HKBK. 316.

Dryopteris porphylophlebia C. Chr., Ind. 285, 1905.
Aspidium porphylophlebium Christ, Bull. Geogr. Bot. Mans. 117. 1904.

Stipes 30-60 cm. long, firm, naked, reddish; fronds 60-90 cm. long, 30 cm. or more broad pinnate; pinnae numerous, 15-20 cm. long, 1.2-1.8 cm. broad; the apex acuminate, the edge with acute falcate lobes under 2 mm. deep; texture subcoriaceous or papyraceous-herbaceous; veinlets 5-7 on a side; sori in rows close to main veins.

N. India, Ceylon, Malaccas, China: Kwangtung, Hongkong, Yunnan, Hupeh, Hunan, Kweichow.

Characterized by upon drying the stipes, rachis, costa and pinnae turning reddish and sori borne at the base of simple veinlets close to the lateral veins.

(P. 161).
Aspidium porphylesphlebium Christ is a large form from Kweichow

Dryopteris pennigera (Forst.) C. Chr. Ind. 283, (1905); Matthew 366, (1911).

Polypodium pennigera Forst., Prod. 82, 1786; HKBF. 317.
Nephrodium pennigera Presl., 1825, N.ZFL. 179.

Stipes tufted, 15-30 cm. long, glabrous, slightly scaly; fronds 45-60 cm. long, 20-30 cm. broad; pinnae 10-15 cm. long, 1.8-2.5 cm. broad, cut about half way down into blunt, falcate, slightly crenate pinnae about 4 mm. broad; lower pinnae gradually reduced, texture firm, herbaceous; rachis and both sides naked, veinlets 6-8 on a side; sori in rows near the midrib.

New Zealand, China: Yunnan.

Var. porphylophlebia C. Chr. Medd. Got. Bot. Trad. 1. 56 (1924).
Dryopteris porphylophlebia C. Chr., Ind. 285, (1905); Matthew 366, (1911).
Aspidium porphylophlebium Christ, Bull. Geogr. Bot. Man. 117, (1904).
Christella porphylophlebia Lev., 1915.

Ample fern over 1 m. tall, pinnate, rachis strong, stramineous, nitid, glabrous in other part; pinnae lanceolate-linear, 25 cm. long, 3 cm. broad, subfalcate, acuminate, base subcuneate, sessile, teeth oblique, obtuse, 3 mm. broad, scarcely 2 mm. deep, acutely serrulate; veins oblique numerous (veins and lobes 40-50 on each side, 3 mm. distant, conspicuously pinnate; lateral veinlets 8, all jointed, sublucid, diaphaneous margin; sori 8, minute, medial; indusium inconspicuous, texture thinly papyraceous, color light green.

Kweichow

Dryopteris prolifera (Retz.) C. Chr. Ind. 286, (1906); Matthew 366, (1911).

Hemionitis prolifera Retz., Obs. 6. 38, 1791.
Polypodium proliferum Roxb.; Wall. 1828; HKBS. 315.
Phegopteris prolifera Kuhn, 1875; Christ 270.
Polypodium luxurians Kze., 1850.
Ampelopteris elegans Kze., 1848.

Rhizomes stout, creeping; stipes spreading, naked, 5-20 cm. long; fronds 30-60 cm. long or more; 15-30 cm. broad, erect or decumbent, often elongated and rooting at the point and branched copiously from the axils; pinnae 10-15 cm. long, 1.2-1.8 cm. broad, broadest at the base, truncate or cordate, the edge bluntly lobed, more than 2 mm. deep, the point often blunt, texture subcoriaceous; rachis and under surface naked or slightly pubescent, veinlets fine, 6-10 on a side; sori medial, oval, sometimes confluent.

Australia, S. Africa, N. India, Polynesia, Philippines, Angola, China: Kweichow, Formosa, Kwangtung, Kwangsi, Szechuan.

Dryopteris urophylla (Wall.) C. Chr. Ind. 299, (1905); Matthew 368, (1911).

Polypodium urophyllum, Wall., Hk. Sp. 5. 9, 1863; HKB. 314.
Aspidium urophylla Christ, 1897; Hain. Fl. 248.
Nephrodium urophyllum Keys., 1873, HFIL. 178.
Polypodium cuspidatum Forb., 1844.
Christella urophylla Lev., 1915.

Rhizome creeping; stipe 60 cm. or more long, stout, erect; fronds 2/3-1.33 m. or more long, 30-45 cm. broad, with a terminal pinna and usually several on each side, which are sometimes 30 cm. long and more
(P. 165.).
than 5 cm. broad, the edge entire and very slightly lobed, the apex acuminate, the base truncate or narrowed; texture subcoriaceous; rachis and both sides naked; veins prominent, the veinlets 15-20 on a side, with sori in two close rows or sometimes one row only.

Australia, Chusan, Hongkong, Ceylon, Formosa, Loochoo, Malacca, Queensland, Polynesia, China: Kwantung, Yunnan, Kweichow.

5 Stegnogramma

Dryopteris stegnogramma (Bl.) C. Chr. Ind. 294, (1905).

Gymnogramme stegnogramma Bl., Fl. Javae, Fil. 98 t. 44. (1828).
Phegopteris stegnogramma Christ, Hain K. Fl. 268.

Nephrodium stegnogramma Diels, NPfl. 181.
Gymnogramme aspidioides Hooker, HIBK. 378, HK. Sp. 5. 150; 2nd, cent, t. 30. (non Kaulf.).

Stipes tufted, 15-23 cm. long, deciduously villose; frond 30-45 cm. long, 15-23 cm. broad, oblong-lanceolate, simple pinnate; pinnae lanceolate, 7.5-12 cm. long, 1.8-3.7 cm. broad, bluntly lobed a quarter or third of the way down to the midrib, truncate at the base; texture herbaceous; rachis and both sides more or less villose; veins pinnate in the lobes, with 6-9 veinlets on a side.

Java, Ceylon, S. India.

The Malayan type has not been recorded from China, the following are two geographic forms recently known from South Szechwan.

Var. asplenioides (J. Sm.) C. Chr.

Gymnogramme stenogramma Bl., 1828.
Gyneuron stenogramme J. Sm., 1854.

This variety was first recorded from Khasia, It differs from the Malayan type by its smaller size, with only two pairs of anastomosing veins and curved sori. The Chinese variety is smaller than the Khasian form; all hairs are short; the crenately lobed pinnae are glabrous below between the veins.

India, China: S. Szechwan - Ta-hsieng-ling.

Var. cyrtomioides C. Chr. Med. Gb, Bot. Trädg. 1. 56. (1924)

Gymnogramme stenogramma Bl., 1826.

Still smaller than the above with perfect entire, more or less falcate pinnae, apex rounded. Rachis and veins densely and softly pilose on account of the presence of long, spreading polycellular hairs. Pinnae 2.5-3 cm. long, 1.5 cm. broad in the smaller fronds with only one pair of jointed veins, 4-5 cm. long, 2-2.5 cm. broad, in the larger ones often with two pairs of jointed veins.

The sori in both varieties are narrower, more or less curved and densely pilose. Basal scales hairy.

S. Szechwan: Ta-hsieng-ling.

9. Meniscium

Dryopteris simplex (Hooker) C. Chr. Ind. 292, (1905); Matthew 567, (1911).

Meniscium simplex Hooker, Lond. Jou. I. 294 t. 11. 1842; HKBL. 390.
Polypodium simplex Lower, 1858.
Nephrodium simples Diels, 1899, NPFL. 177.

Rhizomes firm, wide-creeping; stipes stramineous, slightly pubescent, of the sterile frond 10-15 cm. long, of the fertile 30 cm. long. Fronds simple or 3-lobed, the sterile ones 15-23 cm. long, 5-7.5 cm. broad, oblong-lanceolate, acuminate, the base cordate, sometimes auricled, the edge crenate; the fertile ones similar, but smaller, of subcoriaceous texture; veins pubescent beneath, main veins 3 mm. apart, numerous and parallel, diverging from the midrib and connected by numerous transverse veinlets, which, in the fertile fronds, bear the sori; areolae 8-12 between the midrib and edge.

Kunze considered this as a more simple form of M. triphylla.

Dryopteris triphylla (Sw.) C. Chr. Ind. 298, (1905); Matthew 365, (1911).

Meniscium triphyllum Sw., Schrad. Journ. 1800 / 2. 16. (1801); HKBL. 391.
Nephrodium triphyllum Diels, 1899, NPFL. 178.
Phegopteris triphylla Mett., 1859; Christ 269.
Meniscium parishii Bedd., 1866.

Rhizomes firm, wide-spreading, stipes slender, rather far apart, substramineous, slightly pubescent, of the sterile frond 10-15 cm. long, of the fertile frond 30 cm. or more long; frond pinnate with an oblong lanceolate, terminal pinna 10-15 cm. long, 2.5-3.7 cm. broad, the base cuneate or rounded, the edge repand, and 1-2 similar but smaller ones on each side, the fertile ones smaller than the sterile ones, of subcoriaceous texture; veins beneath slightly pubescent, main veins 3 mm. apart; areolae 6-9 between the midrib and edge.

India, Himalaya Ceylon, Formosa, Malesia, Philippines, Queensland, Hongkong, China: Kwangtung, Kwangsi.

A simple reduced from of D. urophylla (Wall.) C. Chr., differs chiefly in parts being pubescent; sori larger, oblong, filling up the spaces between lateral veins and, particularly, by its dimorphic fronds.

25. Cyrtomium Presl. Tent. Pter. 86, (1836).

Type: Polystichum falcatum L. fil.

Indusium orbicular or reniform, peltate; sori large round;

veins pinnate from a central costa, the lower anterior veins free, the rest angularly and irregularly anastomosing, forming unequal and subhexagonal areolae with which are 1-3 excurrent veinlets or the upper veinlets only angularly anastomosing. Fronds 30-90 cm. high, usually once pinnate, rarely simple; pinnae elliptical-lanceolate, falcate more or less, auriculate at the base, the margin subentire or spinulose. (Cyrtomium: Greek a bow).

About 12 species, chiefly confined to the warmer parts of Asia. 8 are known in southern and central China, where this genus has its headquarter.

A segregate from Polystichum, differing chiefly in the anastomosing veins; distinguished also from Dryopteris by this character and by the centrally attached indusium.

(f. 164).

Key of species

1. Frond simple, broad ovate, base deeply cordate..........
..................................1. C. hemionitis

1. Frond pinnate.

2. Sori regularly disposed in one row on each side of midrib and parallel to it.........2. C. fraxinellum

2. Sori irregularly disposed.

3. Pinnae auriculato-dilated on the upper side of base.

4. Rachis almost naked, pinnae 25-30 pairs.......
.........................3. C. vittatum

4. Rachis scaly, pinnae less than 25 pairs.

5. Pinnae to 3 cm. long, membranaceous, deflexed or horizontal patent.......................
.........................4. C. lonchitoides

5. Pinnae usually over 5 cm. long, texture much thicker or leathery, obliquely ascending..
.........................5. C. falcatum

3. Pinnae not auriculato-dilated at base.

4. Base of pinnae cuneate....6. C. hookerianum

4. Base of pinnae rounded or cordato-rounded.

5. Pinnae opposite, far apart, base rounded...
.........................7. C. grossum

5. Pinnae alternat, close, base cordato-rounded.
........................8. C. pachyphyllum

3. Pinnae cordate, entire, thick coriaceous..........
..............................9. C. nephrolepioides

1. Cyrtomium hemionitis Christ in Bull. geogr. bot. Mans. (1900) 138; C. Chr. Ind. Suppl. 101. (1906-1913).

Rhizome oblique or erect, thick as man's finger, black, covered with the vestiges of persistent stipes; leaves fasciculate (5-6 together) stipes slender, but rigid, stramineous, blackish at the base, 1½ mm. thick, 10-15-18 cm. long, clothed near the base with ovate-lanceolate dark brown entire subulate scales 2/3 cm. long, the parts near the frond clothed in black setae, the matured plant almost glabrous; frond simple, hastato-triangular, base deeply cordate with narrow or close sinus, broadly auriculate, shortly acuminate or acute at the apex, 8 cm. long and broad, margin perfect entire; texture rigid, coriaceous, color light green above, paler and opaque below; veins conspicuous, close, flabellato-pinnate, very oblique, anastomosing into elongate large areoles with 1-2 excurrent included soriferous veinlets; sori numerous, brown, sparsely and irregularly disposed all over the under surface, 1½ mm. broad, subrounded, indusium peltate, larger than sorus turgid, grey, with denticulate margin and raised black centre, persistent or falling off at last.

Kweichow.

This interesting fern differs from all known species in the genus by its simple entire, broadly hastato-cordate leaves, resembling our phyllitis cordiophylla (Hance) Ching in outline. It was first discovered in Pin-fa, Kweichow by Pere J. Cavalerie in 1902 and later in 1911 by Pere J. Esquirol in the same locality. The addition of this species to the genus Cyrtomium has practically completed the uninterrupted line of development of all the types represented in the genus from the very simple form to pinnate and more ample bipinnate forms.
(P. 165).

2. Cyrtomium fraxinellum Christ in Bull. Geogr. Bot. Mans. (1902) 264; C. Chr. Ind. Suppl. 101 (1906-13).

Polystichum fraxinellum Diels, Nat. Pfl. Fam. I. 4. 192; C. Chr. Ind. 582 (1906); Matthew in Journ. Linn. Soc. 39: 386 (1911).

Aspidium fraxinellum Christ, Bull. Boiss. 7: 13 (1899).

Rhizome short, thick, oblique, strong, scales dense, broad, acuminate, ciliated, reddish-brown; stipes 2-5 clustered, 1025 cm. long, dark brown at the base and covered with numerous small subulate-lanceolate dark brown deciduous scales, growing pale grey and sparse upward; frond simply pinnate,

ovate-oblong, to 20 cm. long, 8 cm. broad, scarcely reduced at the base, terminated at the apex sometimes by an entire or sometimes pinnatifid pinna; rachis gray, sparsely scaly or glabrous; pinnae few, usually 5-10 on each side, erect-patent, remote, alternate, lanceolate, acuminate, cuneate attenuate towards the base on short petiole, the edge almost entire but distinctly crenate towards the apex; texture thick coriaceous, smooth, dark glossy green above, very pale and somewhat corrugated (upon drying) below, glabrous, margin slightly reflexed; veins not prominent, numerous, close, anastomosing in a row of narrow areolae almost reaching the margin without included free veinlets or often imperfectly pinnate or rather 2-3 bifurcate in each group; sori 2-3 mm. across, rounded, blackish-brown, uniseriate, terminating a short lateral veinlets in the areola, about 15-30 on each side placed midway between the costa and margin.

Yunnan, Kweichow, Szechwan, Kwangsi.

This distinct species was first collected by A. Henry in Yunnan, on wooded cliff, later by Pere Bodinier in Kweichow in 1989, and still later by Wilson in Szechwan. It is of very late collected in N. W. Kwangsi, where it is a fairly common fern, inhabiting the crevices and niches in limestone cliff. In habit this fern is closely allied to C. falcatum Presl. differs by blackish-brown uniseriate sori, thick leathery glossy green leaves and cuneate base of the pinnae.

3. Cyrtomium vittatum Christ. Bull. Soc. Fr. 52 mem. I. 53, (1905); Matthew 556, (1911).

Polystichum vittatum C. Chr., Ind. 598, (1906).

Rhizomes strong, oblique, stipes stramineous, 20 cm. long, fasciculate, covered with large ovate acute brown scales with pale brown margin; rachis sparingly scaly. Fronds lanceolate-linear, 50 cm. long, 8 cm. broad, acuminate, apex lobato-pinnatifid, base not abbreviate; pinnae numerous, 25-35 on each side, rather close, sessile, falcato-lanceolate, unequal, strongly auriculate on the anterior side at base, the auricle triangular, not free, acuminate, margin subcrenulate, or entire, not aristate, veins inconspicuous, strongly oblique, pinnate irregularly, and rarely anastomosing; sori minute, ochraceous, irregularly subtriseriate, indusium minute, orbicular fugacious; texture herbaceous flaccid, color light green.

Corea, China: Yunnan.

4. Cyrtomium lonchitoides Christ in Bull. Geogr. Bot. Mans. (1902), 264; C. Chr. Ind. Suppl. 101 (1906-1913).

Polystichum lonchitoides Diels, Nat. Pfl. Fam. I. 4. 195; C. Chr. Ind. 685 (1906).
Aspidium lonchitoides Christ, Bull. Boiss. 7: 16 (1899).

Rhizome short, erect, covered with large dark brown lanceolate,
(P. 166).
membranaceous scales and so is the stipe, scales about 1 cm. long, 3 mm. broad, with entire or scarious margin; stipes 5-10 cm. long, dark stramineous; frond 20-30 cm. long, 4-5 or 6 cm. broad, elongate lanceolate, narrowed downward, pinnate under the deeply pinnatifid short apex; rachis covered with stiff spreading linear-subulate light brown scales; pinnae 16-20 on each side, shortly petiolate or subessile, remote, subopposite or alternate, unequal, patent, the lower ones much reduced, triangular auriculate with a sharpe deflexed apex on the upper side, the lower side cut away to the costa, to 3 cm. long, 1.2 cm. broad, entire or more or less sinuate crenulate; texture thin herbaceous; vein very oblique, dense, copiously anastomosing usually with one rarely 2 excurrent included soriferous veinlets; sori very small, numerous, in 3 rows on each side of the costa, inducium very thin, peltate or reniform.

Szechwan, Hupeh, Kweichow, Yunnan.

This species was first discovered by Pere Bodinier in Kweichow. It is most closely related to Cyrtomium falcatum Presl. var. polypterum (Diels), differs by elongate lanceolate frond of almost membranaceous texture and numerous smaller undulate-crenate pinnae.

5. Cyrtomium falcatum (L. fil.) Presl. Tent. 86, (1836).

Polypodium falcatum L. f., Suppl. 446, 1781.
Aspidium falcatum Sw., 1801, Mett. n. 74; HKBK. 257; Christ 232.
Dryopteris falcatum O. Ktze., 1891, HKBK. 257.
Polystichum falcatum Diels, 1899, NPFL. 794.

Stipes tufted, 15-30 cm. long, densely clothed below with large dark, brown papery, scales. Fronds 30-60 cm. long, 15-23 cm. broad, long-oblong in outline, simply pinnate; pinnae numerous, alternate, the lowest ones short-stalked, ovate-acuminate, falcate, 5-10 cm. long, 2.5-5 cm. broad, the margin entire or slightly undulated, the upper side narrowed suddenly, sometimes auricled, the lower rounded or obliquely truncate at the base; texture coriaceous; both surfaces naked, the upper glossy; sori small, copious, scattered over the lower surface.

Japan, Himalayas, China: Chekiang, Shensi, Shansi, Kansu, Szechwan, Hupeh, Kiangsi, Fukien, Kiangsu, Anhwei, Kwangtung, Hongkong, Yunnan.

A widely dispersed, polymorphic species in central and southwestern China.

Var. *caryotideum* (Wall.).

Polystichum falcatum var. caryotideum (Wall.) C. Chr. Ind. 581, 1905.
Aspidium caryotideum Wall., List n. 376, 1828; Hk. et Grev. Ic. Fil. t. 69, 1828.

Pinnae mostly larger than the type, sharpely toothed, slightly lobed, sometimes auricled on 1 or on both sides at the base.

South Africa, Malaya, Ceylon, British India, Sandwich Islands, Japan, Formosa, China: Kweichow, Szechwan, Hupeh, Shensi, Yunnan.

Var. *fortunei* (J. Sm.) Diels, Fl. Cent. China, 195.

Cyrtomium fortunei J. Sm., 1866.

Closed related to the type, except the pinnae are smaller and much narrower and opaque (not glossy above), the base truncate or truncate-auricled.

Japan, Korea, Celebes, Hawaii Africa, Madgascar, China:

(P. 167).
Var. *intermedium* (Diels).

Polystichum falcatum (L. fil.), var. intermedium Diels, Fl. Cent. China 195.

The terminal pinna 3-lobed, the side ones 6-8; stipes 25-30 cm. long; the frond 40 cm. broad, the lower pinnae 10 cm. long, 3 cm. broad, crenate.

Korea, Hupeh - Ichang, Patung; Szechwan - Manchuan.

Var. *polyterum* (Diels).

Polystichum falcatum var. polypterum Diels, Fl. Cent. China 195.

The terminal pinna 3-lobed, the side ones 10-25, stipes 10-15 cm. long, the frond 35-50 cm. broad; the lower pinnae 5-6 cm. long, 1.5-2 cm. broad, crenate or serrate towards apex.

Hupeh - Patung; Szechwan - Manchuan; Yunnan, Hunan.

Var. *polypterum* Diels f. *minor* Brause in Limpricht.

Terminal pinna 3-lobed; the lateral ones 10-25 on each side; stipes 10-15 cm. long, lamina 35-50 cm. long; the lower

pinnae 5-6 cm. long to 1.5-2 cm. wide, with wavy margin or serrate near the apex.

Szechwan, Hupeh, Kiangsu - Wusih, in the hills around the Lake Tai-ho.

Var. acuminatum (Diels).

Polystichum falcatum (L. fil.) var. acuminatum Diels, Fl. Cent. China 195.

The terminal pinna 3-lobed, the side ones 10-12; stipes 25-30 cm. long; the frond 45-60 cm. long; lower pinnae crenate, somewhat shorter than the middle ones, all strongly pointed; the middle ones 14 cm. long, 3 cm. broad, more strongly crenate or almost teethed.

Korea, Szechwan - Nanchuan.

Cyrtomium falcatum (L. fil.) f. macropterum (Diels).

Polystichum falcatum (L.) Diels, f. macropterum Diels, Fl. Cent. China. 194.

Terminal pinna 3-lobed, lateral ones 3; stipes 25-30 cm long; the frond qr cm. broad; lower pinnae 10-12 cm. long, 3 cm. broad, weakly toothed; texture thick.

S. E. Szechwan.

Var. muticum, Christ. Not. Syst. I. 37, (1909).

Ample; stipes 25 cm. long; fronds / 50 cm. long, 20 cm. broad; pinnae on both sides 8-10 under the terminal one, entire and diminuated, ovate or rounded, to 10 cm. long, 8 cm. broad, broadly ovate from the base, almost equal on both sides, margin undulate, subentire, not serrato-aristate.

Yunnan.

Cyrtomium hookerianum (Presl.) C. Chr. Ind. Suppl. 101, (1913).

Polystichum hookerianum C. Chr., Ind. 582, 1906; Matthew 386. 1911).
Lastrea hookerianum Presl., 1836.
Aspidium caducum Wall., 1828; HK. et Grev. Ic. Fil. t. 171, 1829; HKBK. 257; Christ 253 (non) HKBK. 1815).
Polystichum hookerianum Diels, 1899, NPFL. 194.

(P. 168).

Stipes tufted, 30 cm. long, firm, erect, stramineous, scaly below. Fronds 30-60 cm. long, 15-23 cm. broad, simply pinnate, with numerous stalked subdistant lanceolate pinnae on each side, 10-15 cm. long, 2.5-3.7 cm. broad, the apex acuminate, the edge subentire or more or less deeply lobed,

sometimes down to the rachis below; texture coriaceous; midrib below often fibrillose; veins in pinnate groups, which are free or anastomose slightly towards the edge; sori large, in one or two rows on each side of the costa.

N. India, China: Yunnan, Szechwan.

7. Cyrtomium grossum Christ, Bull. Geogr. Bot. Man. 239, (1906).

Rhizomes short, erect, the base of the stipes squamaceous, scales 12 cm. long, ovate acute, brown; leaves few but fasciculated, stipes 11 cm. long, sulcate, stramineous, solitary, sparingly clothed opposite, 4 on each side below a terminal pinna, very shortly petiolate, remote (space about 3 cm. broad) base rounded, very entire, cartilagineo-marginate; terminal pinna 5½ cm. long, rounded at base, 3½ cent, broad and delated in a repand contracted apex (in smaller plant diameter); veins hidden, obliquely forked, free, (in the specimen); -sori rounded, 2 mm. broad, exindusiate (in the sepecimen), both surfaces very glabrous texture hard tough, coriaceous; color o/chraceous-green, luscent, under-side pale, green.

Kweichow.

8. Cyrtomium pachyphyllum (Ros.) C. Chr. Ind. Suppl. II, 11, (1916).

Polystichum pachyphyllum Ros., Fedde Repert., 13, 130, (1914).

Rhizomes erect, paleae castaneous, shinning, margin mimbriate-dentate, 7 mm. long, 2 mm. broad; stipes fasciculated, 15-20 cm. long, stramineous, adpersed with similar but smaller and denser paleae. Lamina linear-oblong, acute, densely fibrillose, pinnate, about 20 cm. long, to 15 cm. wide; pinnae 2-5 on each side under the trilobed apex, very shortly petiolate, erecto-patent, subimbricate-confert, the lower ones slightly remoter, but not reduced about 7½ cm. long, 3-3½ cm. broad, cordate-rounded at base, broadly ovate-lanceolate, shortly acuminate, very entire, margin cartilagineously revolute, terminal pinna hastate-trilobed, distinct or proximately connate; veins concealed, forming 4-5 series of areolae between costa and margin; sori irregularly 3-4-seriate on each side; indusium round-peltate, persistent.

Kweichow: San-cheun.

Easily distinguished from Cyrtomium falcatum (L. fil.) by its fewer, closely conferted and horizontal-patent pinnae.

8. Cyrtomium nephrolepioides (Christ) Ching, comb. nov.

Polystichum nephrolepioides Christ, Bull. Geogr. Bot. Mans (1902) 258 c. fig; C. Chr. Ind. 582 (1906); Matthew

in Journ. Linn. Soc. 39: 387 (1911).

Rhizome short strong; stipes mostly fasciculate, 3-9 cm. long, curved or erect, densely clothed in reddish-brown, ovate diaphaneous scales 3 mm. long, subglabrous upward, terte below, sulcate above; fronds nutant, linear-lanceolate, 5-28 cm. long, 3-4 cm. broad, simply pinnate under the terminal pinnae 4-25 on each side, imbricately confert, the lower ones scarcely reduced, deflexed, subequal, ovate, strongly cordate at the base, very obtuse or rounded at the apex. (P. 169).
shortly petiolate, entire, opaque, brownish-green, thick coriaceous, glabrous, smooth above, corrugated beneath, margin narrowly reflexed; veins hidden, close, anastomosing in a row of large oblique hexagonal areolae with 1 included soriferous veinlet, free towards margin with thickened apex; sori uniseriate or 2 at the base, 5-6 on each side, medial, 1 mm. broad, rounded, indusium small, peltate, deciduous,

Kweichow.

A rare little fern endemic in the province of Kweichow, and its discovery is indebted to Pere J. Eaquirol, 1898. It differs from its all relatives by nodding character of its frond with rather small ovate-cordate entire pinnae of a thick coriaceous texture.

25. A Leptochilus Kaulfuss, Enum. Fil. 147, (1846).

Type: Acrostichum axillare Cav.

Sori linear, continuous, uniserial, on each side of the costa, at maturity they appear covering the entire back of the fertile fronds, destitute of scales. Fronds of two forms; the sterile simple, lobed, or pinnatifid, smooth; the fertile contracted, linear-rachiform, its margin revolute and indusiform, veins of sterile fronds evident, straight or flexuose, pinnate; venules compoundly anastomosing, with included free veinlets (Greek referring to linear form of the fruiting fronds).

Sp. 72, of all moderate-sized ferns, distributed throughout tropical countries of both hemispheres, 9 known from China.

Key to species

1. Sterile frond simple, mostly entire.
   2. Frond oblong-oblanceolate, gradually attenuate, towards short stipe.......1. L. lanceolatum
   2. Frond broadly oblong-lanceolate, stipes above 7.5 cm. long.

3. Frond suddenly narrowed towards the stipe and decurrent along it nearly to the base, midrib and veins distinct, texture thin..2. *L. decurrens*

3. Frond gradually narrowed towards the stipes, veins indistinct, texture thick...3. *L. axillaris*

1. Sterile frond tri-5-lobato-pinnatifid lobes about similar, the terminal one often again broadly trilobed, texture coriaceous.........................4. *L. harlandii*

1. Sterile frond pinnate.

2. Lateral pinnae 2, the terminal one pinnatifid more than half way down into blunt rounded lobes, plant clad in spreading ferruginous hairs...5. *L. zeylanicum*

2. Lateral pinnae more than 2 in number, plants almost glabrous.

3. Terminal pinna different from the lateral ones, usually with prolonged whit-like rooting tip and often pinnatifid.

4. Lateral pinnae usually 2-3 pairs (sometimes 1 pair), the terminal one entire and..................................6. *L. heteroclitus*

4. Lateral pinnae to 7 pairs or more, the terminal one pinnatifid, into blunt rounded lobes...............................7. *L. cuspidatum*

3. Terminal pinna scarcely different from the lateral ones; lateral pinnae numerous.

4. Lateral pinnae slightly serrate, texture membranaceous...............8. *L. lomarioides*

(P. 170). 4. Lateral pinnae repand or bluntly lobed to 1/3 wan down, texture coriaceous.....................................9. *L. virens*

1. *Leptochilus lanceolatus* Fee, Acrost. 87 t. 47 f. (1845); Matthew 371, (1911).

Acrostichum lanceolatus Hooker, 1864 HKBK. 420 (none L. 1753).
Gymnopteris lanceolatus Bedd., 1876, NPFL. 199.
Gymnopteris normale J. Sm., 1841.
Gymnopteris variabile var. lanceolata (Hk.) Bedd, Handb. 429.

Rhizomes woody, wide-creeping; stipes of barren fronds 2.5-13 cm. long; barren fronds, 15-30 cm. long, 1.2-2.5 cm. broad, oblanceolate, the point blunt or acute, the edge entire, the lower part narrowed very gradually; texture herbaceous; surface naked; main veins raised, but falling considerably short of the edge; areolas copious, with free veinlets; fertile fronds narrowly linear 15-30 cm. long, 3-6 mm. broad on a slender stipe as long as or longer than the frond.

India, Ceylon, Malayas, Philipines, China: Hainan, Kweichow.

2. *Leptochilus decurrens* Blume, Enum. 206, (1828); Matthew 371 (1911).

Anapausia decurrens Presl., 1849.
Acrostichum variabile Hooker, 1864, HKBK. 285.
Gymnopteris decurrens Bedd., 1868, Christ 48; NPFL. 199.
Gymnopteris variabile Bedd, Handb. 427.

Rhizomes wide-creeping; stipes of barren fronds 0-15 cm. long; barren fronds 15-43 cm. long, 3.7-7.5 cm. broad, oblong-spathulate, with a very long gradually-narrowed shaft, the point blunt or acute, the edge entire, texture papyraceo-herbaceous; surfaces naked, main veins raised, zigzag, reaching nearly to the edge, with copious fine areolae with free veinlets between them; fertile fronds 15-30 cm. long, 4-6 mm. broad; the stipe often 30 cm. long.

Himalayas, Ceylon, Java, China: Yunnan, Hainan. (McClure 1921).

I think Beddome was corect in considering *L. lanceolatum* and *L. axillaris* are mere varieties of the present species as the former both are in fact only reduced forms of the latter.

3. *Leptochilus axillaris* (Cav.) Klf. Enum. 147, (1824).

Acrostichum axillaris Cav., Anal. Hist. Nat. i. 101. 1799-; Descr. 239, 1802; HKBK. 320.
Gymnopteris axillaris Presl., 1836, NPFL. 199.
Gymnopteris variabile var. axillaris Bedd., Handb. 430.

Rhizome creeping; fronds simple, lanceolate, 12.5-23 cm. long, narrowing into a stipes 2.5-7.5 cm. long, obtuse or acuminate, 1.8-2.2 cm. broad, glabrous, rather thick, the pinnate and reticulate veins immersed and inconspicuous. The fertile longer, narrowed; sori rather large, distinct, in 3-4 or rarely 5 longitudinal rows on each side of the midrib.

Korea, Hongkong, S. China.

This species and L. lanceolata are often regarded as merely varieties of L. decurens as they are quite variable in the shape of sterile fronds (cf. Bedd's Fern. Brit. Ind. 429).

4. *Leptochilus harlandii* Hk. C. Chr. Ind. 285, (1905); Matthew 370, (1911).

Acrostichum harlandii Hooker, HKBK. 418.
Chrysodium harlandii Hance, 1873.
(P. 171).
Gymnopteris decurrens Hooker, 1857.
Gymnopteris harlandii J. Sm, 1857; NPFL. 199.

Caudex woody; stipes 30-45 cm. long, firm, glossy chestnut-brown, scaly at the base; barren fronds simple or with an oblong-spatulate entire terminal pinna, sometimes 30 cm. long, 7.5 cm. broad, and 1-2 smaller similar ones on each side, usually connected at the base, all acuminate; texture coriaceous; main veins distinct, connected by transversed veinlets with copious areolae with free included veinlets; fertile feronds smaller, but the pinnae much smaller.

Formosa, Hongkong, China: Kwangtung.

5. *Leptochilus zeylanicus* (Houtt.) C. Chr. Ind. 388, (1905); Matthew 370, (1911).

Ophioglossum zeylanicus Houtt., Nat. Hist. 14. 43. 1783; Pfl. Syst. (ed. germ.) 131. 47 t. 94 f. 1. 1786.
Osmunda trifida Jacq., 1789.
Acrostichum quercifolium Retz., 1791, HKBK. 418.
Gymnopteris quercifolium Bernh.; Christ 49; NPFL. 200.
Leptochilus quercifolium Fee, 1845.

Rhizomes stout, wide-creeping; stipes of barren fronds 2.5-5 cm. long, clothed with soft spreading ferruginous hairs; barren fronds 7.5-10 cm. long, 3.7-5 cm. broad, the terminal pinna with blunt rounded lobes, reaching sometimes 1/4 of the way to the rachis; below this usually a pair of small sessile ovate blunt auriculate lateral ones; texture thin-herbaceous; veins beneath hairy; main veins distinct to the edge, with copious areolas with free veinlets between them; fertile fronds with a terminal pinna 2.5-5 cm. long, 2 mm. broad, a pair of smaller lateral ones, the stipe slender, 15-23cm. long, naked except at the base.

India, Cochin-China, Formosa, Ceylon, Hongkong, China: Hainan, Kwantung, Yunnan, Kwangsi.

6. Leptochilus heteroclitus (Presl.) C. Chr. Ind. 385, (1905); Matthew 370, (1911).

Acrostichum heterolitus Presl., Rel. Haenk. I. 15 t. 2 f. 2. 1825.
Chrysodium heteroclitus Kuhn, 1869.
Acrostichum flagelliferum Wall., HK. et Grev. 1827; HKBK. 418.
Gymnopteris heteroclitus Bedd., 1876; Christ 49; HPFL. 201.
Gymnopteris inconstans Copel., 1905.

Rhizomes woody, creeping, scaly; stipes close, of barren fronds 15-30 cm. long, nearly naked, the latter simple or with 1-3 pairs of pinnae, the terminal ones several times larger than the lateral ones ovate-lanceolate, entire or repand, and often very much elongated and rooting at the point, the lateral ones 7.5-15 cm. long, 2.5-5 cm. broad, sometimes also prolonged; texture herbaceous; rachis and both sides naked; main veins pinnate, with copious areolae between them, with few or no free veinlets; the stipes in fertile fronds at least twice as long; lamina 5-7.5 cm. about 1.2 cm. broad, pinnate, pinnae 2-3 on each side, far apart, the terminal much the largest, 2-3 in long, about [illegible] in. broad.

Himalayas, Java, Philippines, Formosa, China: Kwantung, Szechwan- Omei Shan.

(P. 172).
7. Leptochilus cuspidatus (Presl.) C. Chr. Ind. 384, (1905); Matthew 371, (1911).

Polypodium cuspidatum Presl., 1836.
Gymnopteris cuspidatum Christ., 1897, Farn. Erd. 50; HPFL. 201.
Acrostichum repandum Blume, 1828; HKBK. 419.

Rhizome thick, shortly creeping, fronds 30-45 cm. high, pinnate; segments of the sterile 11-21, lanceolate, more or less sinuate; the terminal one longer, almost pinnatifid ending in a point, often viviparous; lateral ones mostly petiolulate; primary veins pinnate, sparing branched and anastomosing, with here and there a free branches. Fertile fronds distinct with the pinnae rather smaller.

India, Polynesia, Australia, Hongkong, Formosa, China: Hainan.

8. Leptochilus lomarioides Bl. Enum. 206, (1828); Matthew 371, (1911).

Acrostichum blumeanum Hooker, HKBK. 423.
Poecilopteris blumeans. Bedd., 1870.

Lomagramme pteroides J. Sm., 1875.
Gymnopteris blumeana Bedd., 1876; NPfL.

Rhizomes woody, side-scandent; stipes of barren frond 15 cm. long, decidedly scaly; barren frond 30-40 cm. long, 30 cm. long, 2.5 cm. broad, the apex acuminate, the edge slightly toothed, the base rounded; texture membranaceous; rachis and midrib beneath slightly scaly, areolae hexagonal, without free veinlets; fertile fronds with distant pinnae, 6.2 cm. long, 1.2 cm. broad, more distinctly toothed.

Assam, Java, Philippine, Samoa, China: Kwangtung.

9. Leptochilus virens (Wall.) C. Chr. Ind. 388, (1905); Matthew 371, (1911).

Acrostichum virens Walls., HK et Grev. Ic. Fil. t. 221, 1831; HkBK, 420 (pt.).
Acrostichum contaminans Wall., 1828.
Gymnopteris contaminans Bedd., 1876; Christ 50; NPfL. 201.
Acrostichum crispatulum Wall., 1828.
Poecilopteris semicordata Moore, 1868; Bedd. 1868.
Acrostichum semicordatum Baker, HkBK. 422.

Gymnopteris semicordata J. Sm., 1875; Hk. 2 Cent. t. 88.

Rhizomes woody, short-creeping, stipe of barren fronds 30-~~4~~60 cm. long firm, erect, naked, the latter 30-90 cm. long often 30 cm. more, with numerous sessile pinnae on each side, which are 10-20 cm. long, 1.8-2.5 cm. broad, the edge repend or bluntly lobed, the terminal one sometime elongated and rooting at the point; texture subcoriaceous; rachis and both surfaces naked; veins pinnate, main veins distinct, the veinlets of opposite groups joining, with usually a single quadrangular areole between them, free veinlets none fertile fronds on longer stems, the pinnae 5-10 cm. long 3-13 mm. broad, linear or ligulate entire or lobed.

Himalayas, Ceylon, Formosa, Moulmein, Angola, China: Kweichow

A quite variable plant with several closed allied species.

26. Aspidium Swartz, Schrad. Journal 1800^{2}. 29. (1901).

Type: Polypodium trifoliatum L.

Sori roundish, rarely oblong, compital (on connected veinlets, or on free veinlets. Indusium round or reniform, attached by a central
(P. 173).
point or at the apex of a more or less deep sinus, very rarely

oblong and attached by a short, longitudinal axis, opening all round the edge or nearly so. Fronds uniform or nearly so, often inclined to a triangular shape, simple or divided, if divided the lowest pinnae often inclined to a strong development of the basiscopic side; texture often herbaceous; veins anastomosing more or less copiously and irregularly; areolae with or without included free veinlets. Rhizomes creeping or erect; stipes not articulate to the rhizome.

An almost pure tropical genus of about 55 species of which over 50 are from Asia, 26 known in China.

Key to species

1. Veins compoundly anastomosing copiously with included veinlets in areolae; indusium present, orbicular or reniform (Sagenia).
  2. Fronds simple, entire or variously lobed.
    3. Frond simple; texture thin membranaceous, glabrous ....1. A. leptophyllum
    3. Fronds variously lobed.
      4. Frond trilobed, lobes entire or crenate........ ....2. A. morsei
      4. Frond 5-lobed, lobes slightly undulate......... ....3. A. subpedatum
      4. Frond lobulato-pinnatifid into 4-5 pairs of sinuate linear-oblong segments................ ....4. A. decurrens
  2. Fronds 3-foliate, pinnae (lower ones) usually deeply pinnatifid, but not pinnate.
    3. Sori regular in 1 or 2 rows between the costa and margin.
      4. Terminal pinna entire, texture subcoriaceous... ....5. A. pachyphyllum
      4. Terminal pinna deeply pinnatifid, texture thin papery.
        5. Frond castaneously pubescent near the costa beneath..................6. A. yunnanense
        5. Frond glabrous beneath..7. A. variolosum
    3. Sori scattered irregularly.
        5. Fronds trifoliate, texture herbaceous....... ....8. A. esquirolii
        5. Frond more than trifoliate, i. e., with 2 or more pairs of lateral pinnae between the terminal and basal ones; texture subcoriaceout..................9. A. plymorphum
      4. Terminal pinna deeply pinnatifid or trilobed.
        5. The terminal pinna trilobed, lobes entire... ....10, A. polysorum
        5. The terminal pinna deeply pinnatifid........ ....~~11. A. melanocaulon~~
          6. Rhizome ascending, stipes ebeneous...... ....12. A. subtriphyllum
          6. Rhizome creeping, stipes substramineous...........11. A. melanocaulon

2. Fronds bipinnate, at least in the lower part.
    3. Stipes shining ebeneous......13. A. ebenium
    3. Stipes not so.
        4. Sori in 1 regular row between the costule and margin, induciate.
            5. Rachis naked...........14. A. coadunatum
            5. Rachis densely pubescent....................... ....15. A. pinfaense
        4. Sori in 2 rows, induciate.
            5. The lower pinnae 30 cm. long, rachis broadly winged above..........16. A. apifolium
            5. The lower pinnae much shorter, rachis not winged above..........17. A. cicutarium

(P. 174).

        4. Sori irregular, ex-induciate.................... ....18. A. longicrure

1. Only lower veinlets of the contiguous groups arcuatly anastomosing in one series of areolae along the costa without free included veinlets, and the upper ones generally free. (Pleocnemia).
    2. Stipes subarborescent............19. A. leusseanum
    2. Stipes not so.
        3. Pinnae 20 cm. or more long, pinnatifid over ½ way down.........................20. A. giganteum
        3. Pinnae to 10 cm. long, much less deeply pinnatifid ....21. A. membranifolium
1. Tectaria
    2. Fronds simple.....................22. A. singaporianum
    2. Fronds pinnate.
        3. Fronds deltoid with 1 or 2 pairs of lateral pinnae between the terminal and basal ones.............. ....23. A. trifoliatum
        3. Fronds deltoid with more than 2 lateral pinnae between the terminal and basal ones............. ....24. A. devexum?
1. Like sagenia, except sori exinduciate (Arcypteris); Fronds trifoliate....................25. A. rheosorum
1. Like Sagenia, except veinlets sporangiferous, forming distinctly reticulated exinduciate sori (Dictyocline).. ....26. A. griffithii

1. Aspidium leptophyllum (Wright) C. Chr. Ind. Suppl. 8. (1913).

Nephrodium leptophyllum C. H. Wright, Kew Bull. 11, 1906.

Fronds caespitose, lanceolate, not divided, 23 cm. long, 2.5-3.8 cm. broad, thin membranaceous, glabrous, base long attenuate, margin slightly undulate; stipes short, sparcely clothed with brown, narrow; paleae primary veins reaching margin; sori diffused; inducium 0.2 cm. in diameter.

Tonkon, China: Yunnan.

Allied to A. singaporianum Baker, differing by larger and fewer sori.

2. Aspidium morsei (Bak.) C. Chr. Ind. Suppl. 8, (1913).

Nephrodium morsei Baker, Kew Bull. 11, 1906.

Caudex unknown; basal paleae lanceolate, rather firm, sorbid brown; stipes 15-37 cm. long, stramineous, slender, naked above the base; lamina deltoid, 15-20 cm. long, gree, dorsal side pilose, profoundly trilobate, central lobes larger than the basal ones, entire or crenate, ovate, acuminate, 6.2-7.5 cm. broad; primary veins extending to the margin, parallel, with copious areolae between them, veinlets free; sori biseriate, placed near the primary veins, inducium firm, glabrous.

Kiangsi; Lungchow.

Differs from A. tripartigum (Baker) by pale stipes and smaller sori which are placed near the large primary veins.

3, Aspidium subpedatum (Hars.) Diels, NPFL. 14. 186 (1899); Matthew 30, (1877).

Nephrodium subpedatum Harring, Journ. Linn. Soc. 16. 30 1877.

Stipes 30 cm. long, slender, stramineous. Fronds 15-20 cm. long, 13-17 cm. broad, ovate, simple, 5-lobed, the lower divisions shallow, the upper exteding two-thirds of the way down to the base; apex acuminate
(P. 175).
base cordate, margin slightly undulate; the central lobe much the largest ,ovate; texture papyraceous; areolae copious, each with 1-3 included free veinlets; veins distinct nearly to the margin; sori few, small, scattered.

Formosa, China: Kwangsi.

4. Aspidium decurrens Presl. Rel. Haenk. 1. 28. (1825); Christ. 229; NPFL. 186; Matthew 342, (1911).

Sagenia decurrens Houlst., 1857.
Nephrodium decurrens Baker, 1867, HKBK. 229.
Gardrochlaeus alata Fee, 1850-52.
Tectaria decurrens Cop., 1907.

Rhizomes creeping; stipes narrowly winged, often nearly or quite to the base. Fronds 2/3-1 m. long, 30 cm. or more broad, cut down to a winged rachis into 4-5 pairs of sinuate linear-oblong pinnae 15-30 cm. long, 3-6 cm. broad, the lowest sometimes forked; texture subcoriaceous; principal veins distinct to the edge, connected by copious areolae with free included veinlets; sori large, in two regular rows between the principal veins, each consisting of 5-6 subrounded large sori. Rachis and costa deep stramineous when dried.

N. India, Ceylon, Philippines, Malaccas, Fiji, Samoa, Formosa, Loochoo, Hongkong, China: Kweichow, Kwantung - Tinwu Shan.

5. Aspidium pachyphyllum Kze. Bot. Zeit. 259, (1848); Christ 229; NPFL. 85.

Nephrodium pachyphyllum Baker, HKBK. 299, 1868.
Dryopteris pachyphyllum O. Ktze., 1891.

Stipes 30 cm. long or more long, naked, brownish; frond 6-90 cm. long, 28-45 cm. broad, with an oblong-lanceolate, entire, or sinuated terminal pinnae 15-30 cm. long, 2-3.7 cm. broad and 4-8 similar erecto-patent lateral ones on each side, the lower ones forked at the base; texture subcoriaceous; primary veins straight and distinct nearly to the edge; areolae fine, with copious free included veinlets; sori large in two regular rows.

Fiji, Formosa, Philippins, Malayas, China: Kweichow.

6. Aspidium yunnanense (Baker) C. Chr. Ind. Suppl. 9 (1913).

Nephrodium yunnanense Baker, Kew Bull. 11, 1906.

Stipes elongated, slender, subnaked, castanaceous; paleae linear brown, membranaceous; lamina deltoid, large, membranaceous, bipinnatifid, green on both sides; glabrous above, and costaneous pubescent toward the costa underneath; the lower pinnae deltoid, 30 cm. or more long, much produced in the lower ones, shortly petioled, profoundly pinnatifid, secondary lobes almost all ovate-lanceolate, acute, entire, sinuate margin; veinlets copiously anastomosing into hexagonal areolae with free included veinlets; sori superficial, 1-2-seriate between costa and margin; inducium membranaceous, glabrous, persistent.

Yunnan: Red river mountain.

Intermediated between A. latifolium Baker, and Aspidium cicutarium Baker.

7. Aspidium variolosum Wall. List n. 379, (1828); HKBK. 298; HK. Sp. 4. 51, 1862; Christ 228; NPFL. 185; Matthew 343, (1911).

Nephrodium variolosum Baker, 1867.
Dryopteris variolosum O. Ktze, 1891.
(P. 175).

Rhizomes creeping; stipes 30 cm. or more long, naked, brownish. Fronds 30-45 cm. long, 20-30 cm. broad, subdeltoid, the apex deeply pinnatifid, with lanceolate, acuminate, entire or sinuated lobes, below this 1½-3 pairs of lateral pinnae, the lowest much the largest, sometimes cut down to rachis

at the base with a deeply pinnatifid pinnule; texture papyraceo-herbaceous; primary veins distinct; areolae rather large, with free veinlets; sori large in rows near the veins, terminating free veinlets.

N. India, Malayas, Formosa, China: Kweichow.

It has quite the habit and texture of A. subtriphyllum (Baker) but differs in sori and venation.

8. Aspidium esquirolii (Christ) C. Chr. Ind. suppl. 8, 1913.

Sagenia esquirolii Christ, Bull. Geogr. Bot. Man. 249, (1906).

Rhizomes short, oblique, leaves few (2-3), fasciculated; stipes 46 cm. long, slender, carlaneous, angular, base black, incrassate and covered by sparce lanceolate-subulate dark-fuscous scales, glabrous in other parts rachis quite proliferous towards the base of fronds. Fronds palmate, slightly dimorphic, i. e. the soriferous ones moderately contract, horizontal at base, very broadly deltoid, 20 cm. long, 30 cm. broad, tripartite, central pinna more or less petiolate, 16 cm. long, 7 cm. broad, oblong, attenuate towards base, apex caudate-acuminate, margin entire or coarsely and obtusely lobato-dentate, the two lateral pinnae subsessile, of the similar shape, but deeply lobed, i. e. cut down below the middle, lobes ovate, caudate; costa slender, brown, conspicuous lateral veins 15-18 on each side, erect, extending to the margin, slender but conspicuous, 7 mm. for apart; transversal veinlets about 7 between costa and margin, areolae inconspicuous, subquadrate, numerous, including all forked free veinlets; sori dense, termina on the forked veinlets, brown, impressed, and prominently punctate on the upper surface indusium minute, gray, corrugated; texture herbaceous, color dark green, opaque.

Kweichow.

9. Aspidium polymorphum Wall. List n. 382, (1828); H. Sp. 4. 54, (1862); Christ 229; NPFL. 185, Matthew 343, (1911).

Nephrodium polymorphum Baker, HKBK. 297, 1867).
Dryopteris polymorphum O. Ktze., 1891.
Aspidium grandifolium Mett., 1858.
Nephrodium wightii Clarke, 1880.

Rhizomes creeping; stipes 30 cm. or more long, naked, brownish; frond 2/3-1.33 m. long, 30-45 cm. broad, with a large, oblong, entire terminal pinna 15-30 cm. long 2.5-5 cm. broad, and 2-6 similar lateral ones on each side, the lower ones often forked; texture subcoriaceous; principal veins distinct to the edge; areolae fine, close, with copious free veinlets; sori small, scattered, abundant, all on the connected veinlets.

Ceylon, peninsular, India, Formosa, China: Kweichow, Yunnan.

Recently recorded in China.

10. Aspidium polymorum Ros. Fedde Repert. 13, 133, (1914).

Rhizomes erect, ligneous; paleae narrow lanceolate about 1 cm. long, 1 mm. broad, of rather a firm texture. Fronds subdimorphic; stipes fasciculate, erect, 30-40 cm. long, and slightly longer in the fertile ones, 2 mm. thick, angular, densely covered below by the same
(F. 178).
paleas as in rhizomes, rather naked upwards, the sterile lamina ovate-oblong, about 20 cm. long, 18 cm. broad, tripartite, chartaceous, upper surface green and smooth, the lower slightly paler and densely puberulous along the costa and veins, lateral pinnae one-jugate, erect-patent, shortly petiolate gemiferous at base, furcate, the other parts entire, about 18 cm. long, 5 cm. broad in the middle, the terminal pinnae narrowly decurrent along the petiole about 3 cm. long, trilobed; the middle lobe about 15 cm. long, 8 cm. wide in the middle, ovate-oblong, acuminate, entire, the lateral lobes slightly shorter and narrower, but often abscent in poorly developed leaves. Costules in lateral pinnae about 20 pairs, slightly curved, extending to the margin, prominent, about 6 mm. far apart, forming with veinlets about 10 primary areolae between margin and midrib, the areolae of secondary veinlets including numerous free furcated veinlets. The fertile lamina similar to the sterile but smaller, about 18 cm. long, 15 cm. wide, with veins rarely forming primary and secondary areolae, but in most cases only simple or furcated, free, and soriferous at the apices; sori small numerous, irregularly placed between costa and margin in about unequal 20 rows of 4-10 sori each; reniform, margin erosed.

Kweichow: Ta-tsing.

Differs from Aspidium subtriphyllum HK. and Aspidium nebulosum Baker by its entire-margined pinnae and by the order of meshes in the sterile fronds.

11. Aspidium melanocaulon Blume, Enum. 161, (1828); Matthew 343, (1911).

Sagenia melanocaulon Moore, 1858.
Nephrodium melanocaulon Baker, HKBK. 296, 1867.
Dryopteris melanocaulon O. Ktze., 1891.
Aspidium durvillaei Bory, 1828.
Cardiochlaena subpinnatifida Fee, 1850-52.

Rhizomes ascending; stipes 50 cm. or more long, ebeneous, glossy, scaly at the base. Fronds 37 cm. long, 23-37 cm. broad,

ovate-deltoid, with a large, deeply pinnatifid, terminal pinna, and 1 to 4 lateral ones one each side, the central one deeply pinnatifid, with ovate-acuminate lobes, the lowest stalked, 15-30 cm. long, 10-15 cm. broad, often again pinnate at the base; texture papyraceous, herbaceous; rachis ebeneous; main veins reaching the edge, with numerous fine areolas with free included veinlets between them; sori numerous, minute, scattered; induсium small, fimbricated, fugacious.

Philippins, Malayas, China: Hainan, Kweichow, Yunnan.

12. Aspidium subtriphyllum (Hk. et Arn.) Hk., Sp. 4. 52, (1862); Christ 227; H.F.L. 185; Matthew 343, (1911).

Polypodium subtriphyllum Hk. et Arn. Bot. Beech. Voy. 256 t. 50, 1836-1840.
Sagenia subtriphyllum Bedd., 1863.
Nephrodium subtriphyllum Baker, HkBk. 296, 1867.

Rhizomes creeping; thick as a raven's quill, paleae dark brown, lanceolate-subulate, spreading 3-4 mm. long; stipe 30 cm. or more long, substramineous or brownish sparcely paleaceous near base; Fronds 30-44 cm. long, 20/0-30 cm. broad, subdeltoid, with a large, deeply pinnatifid apex with lanceolate lobes, below this 1 or 2 pinnae on each side, the lowest shortly stalked, distant, forked at the base or pinnatifid with the basal ones on the lower side much the largest, the apex
(P. 179).
lanceolate; texture herbaceous; main veins distinct to the edge; areolae fine with copious free veinlets; sori rather large but scattered, confined to the connected veinlets; plants glabrous or somewhat ferruginous villose on the veins beneath or over whole under surface.

Panma, Ecuador, Polynesia, Malaya, Ceylon, Formosa, Loocho, Hongkong, China: Hainan, Kwantung.

13. Aspidium ebenium C. Chr. Bull. Geogr. Bot. Mans. (1913) 138; Ind. Suppl. 5. (1913-16).

Stipes and rachis shining, ebeneous, very shortly tomentose on the upper side; frond ample, deltoid, about 70 cm. long, 60 cm. broad at the base, dark green, texture thin herbaceous, costa like the rachis very shortly reddish-tomentose on the upper side, otherwise the entire plant glabrous, bipinnate to tripinnatifid; the lower 2 pairs of pinnae petiolate, alternate, 15 cm. far apart, the upper 2 sessile but free, the uppermost broadly adnate or confluent upward, connected by a wing 1-3 cm. broad, the basal pinnae much the largest, pinnate below into sessile or adnate pinnules, pinnatifid upward into 6-8 segments connected by a wing 1-1 cm. broad, the basal 2 free pinnules 10-17 cm. long, 5-6 cm. broad, oblong-lanceolate, acuminate, cuneate-rounded

at the base, pinnatifid half way down, the middle segments about 10 cm. long, 3-5 cm. broad, broadly lobed or pinnatifid; lobes subfalcate, obtuse, broadly crenate, 1-1.5 cm. broad; the middle pinnae and the segments below the apex of the frond pinnatifid in the similar manner as the basal pinnae; veins distinct, reticulate, areolas 5-6-gonous, usually with included free veinlets; sori subirregular, on the ultimate lobes, uniseriate, 7-3 on each side of the costule, leaving a broad blank space in the middle, indusium corrugated, persistent, peltate, dark brown.

Kweichow.

A large fern in the genus, closely allied to A. cicutarium Sw. differs only by shining ebeneous stipe, rachis and costa and much shorter inferior pinnules than those next above. Collected in Kweichow under forest by Père J. Esquirol, 1910.

14. Aspidium coadunatum Wall. List n. 377, (1828); Hk. et Grev. Ic. Fil. t. 202, (1831); Mett. n. 118; Matthew 342, (1911).

Tectaria christii Cop., Philip. Journ. II. 416. 1907.
Sagenia coadunata J. Sm., Bedd. Ferns S. Ind. t. 81.
Aspidium cicutarium var. coadunatum C. Chr., Ind. 68, 1906.

Caudex stout, ascending, clad at apex with black flaccid subulate scales; stipes rufous, more or less naked, sparcely scaly at the base, the scales acute, flaccid, brown. Fronds 30-90 cm. long, pinnate, the rachis naked, smooth, glossy, flavido-rufous; pinnae pinnatifid, more or less 1-4 on each side below the deeply pinnatifid terminal one, the lowest largest, oval-lanceolate, acute, deeply pinnatifid, the lobes broadly ovate, obtuse or subacute, crenate or lobed; texture thin, diaphanous upper surface clothed with short, white pubescence, the margin ciliate, costules slightly pubescent; veins copiously anastomosing, with copious included calavate free veinlets. Sori in 1 row on each side of the costules, indusium orbicular-reniform with a pale margin.

Tropical Asia, India, China: Kwantung, Kweichow, Yunnan, Szechwan.

Most frequently confounded with A. cicutarium. Sw. but can
(P. 180).
easily be distinguished from its ally by

15. Aspidium pinfaense Christ, Bull. Geogr. Bot. Mans. (1906) 250, Geogr. Bot. Mans. Mem. XX, 172 (1909); Matthew 343, (1911).

Sagenia - Christ, Bull. Geogr. Bot. Man. 250 (1906).

Rhizomes woody, thick as a man's finger, scales brown, rigid, lanceolate - subulate, 1 cm. long, stipes thick as goos's quill, 30 cm. long, glabrous and like rachis reddish-yellow; lamina 54 cm. long, 27 cm. broad at base, oblong-acuminate, pinnate, but the lowest pinnae broadened toward base and pinnate down to the rachis, deltoid, petiolate, 12 cm. long, 5 cm. broad, deeply lobated, lobes about 8 on each side, rather obtuse, rounded-crenate; the other upper 3 pairs of pinnae under the apex acuminate, coarsely lobated, lobes about 8 on each side, obtuse, rounded-crenate, or entire; apex deeply lobed to a very broad wing, similar to the upper pinnae; costa fulvous, costules green, straight veins very fine, areolae oblong, close, with free included veinlets; rachis costa, costules, veins and both surfaces most shortly but densely pubescent; sori large on lobes, uniseriate, close to costules, ochraceous, 4-5 on each side, 2 mm. broad; indusium thin contracted when; texture softly herbaceous, color light green.

Kweichow.

16. Aspidium apifolium (Hk. et Arn.) Schkuhr. Kr. Gew. I. 198 t. 56. f. b. (1809); Matthew 342, (1911).

Nephrodium apifolium Hk. et Arn., Bot. Beech. Voy. 105, 1832.
Sagenia apifolia J. Sm., 1841.
Aspidium cicutarium var. apifolium C. Chr., Ind. 68, 1906.

Stipes and rachis dark purple, glossy shining, glabrous, frond-bipinnate, pinnae broad=lanceolate, membranaceous, pinnatifid, acuminate, the superior ones confluent; segments oblong=lanceolate, sinuately sub-subpinnatifid, glabrous subciliate, puberulous above. Sori subseriate. Indusium orbicular, attached by a small sinus.

Szechwan.

17. Aspidium cicutarium (L.) Sw. Schrad. Journ. 1800^2. 36, (1801); Christ 250; NPFL. 186; Matthew 342, (1911).

Polypodium cicutarium Linn., 1759.
Nephrodium cicutarium Baker, HkBk. 299. 1867.
Sagenia coadunata Moore, 1857.
Aspidium latifolium Presl., 1825.
Tectaria cicutaria Cop., 1907.

Stipes 30 cm. or more long, brownish or ~~b~~ebeneous. Fronds 30-60 cm. long, subdeltoid, the apex deeply pinnatifid, with sinuated lanceolate lobes; below this 3-5 pinnae on each side, the lowest subdeltoid, deeply pinnatifid or pinnate below; texture papyraceous herbaceous or subcoriaceous; main veins distinct to the edge; areolas with few or no included free veinlets; sori rather large, in two rows near the main

veins on connected or free veinlets.

Tropical America, Himalayas to Formosa, China: Szechwan - Omei Shan, Yunnan, Kwantung, Hainan.

(P. 181).
Var. tenuifrons Christ, Bull. Geogr. Bot. Mans. XI. 257, (1902); Matthew 342, (1911).

Distinct for its texture being very thin, diaphanous, pinnae short (15 cm. long, 10 cm. broad, lobes close, wingless on the rachis between them, regularly cut into quite obtuse ovate lobules, sori rather large.

Probably a new species.

Kweichow.

18. *Aspidium longicrure* Christ in Bull. Geogr. Bot. Mans. (1909) Mem. XX. t. Chr. Ind. Supple 8 (1906-13); Matthew in Journ. Linn. Soc. 39: 348 (1911).

Sagenia longicrure Christ, Bull. Geogr. Bot. Mans. (1906) 250.

Stipes to 30 cm. or more long, shining, reddish-brown, glabrous; frond deltoid-oblong, 40 cm. long, 35 cm. broad, bipinnate to tripinnatifid in the lower part, rachis and the base of costa shining, light ebeneous deeply grooved above; terminal pinna large, petiolate deeply trilobed, deltoid, the central lobe oblong, 15-30 cm. long, the upper ones 8 cm. long, long-petiolate, the uppermost ones subsessile, oblong, caudate, with obtuse hastate base, the middle pinnae deeply 3-lobed down to the base, the lowest pinnate; pinnules 2, far apart, petiolulate, with hastate or deeply lobed base; the terminal pinnules deeply trilobate; all pinnae ascendingly patent, the uppermost pinnules to 10-13 cm. long, 4 cm. broad, margin repando-crenate, all pinnae and pinnules acuminate, or long caudate; lateral veins in about 6 between costa and margin, usually without free included veinlets; sori very numerous, capital or adorsal, small, almost punctate, dark brown, irregularly disposed, indusium destitute; texture thin herbaceous, lustreous green, surfaces naked but the costa and veins, which are shortly pubescent.

Kweichow, Kwangsi.

A bipinnate species of the group A. cicutarium, very distinct for pinnae and lower pinnules being long-petiolate, elongated narrow, few-lobed pinnules and segments with very long-acuminate apex, stipes and rachis reddish-ebeneous, polished, and very small irregular exinduciate sori. Collected for the first time by Pere Cavalerie in Kweichow, 1904, later by J. Esquirol in the same locality and of very late from Kwangsi.

19. *Aspidium leuseanum* (Gaud.) Kze., Bot. Zeit. 474, (1846)
Mett. n. 278; Christ 251; NPFL. 187; Matthew 343, (1911).

Polypodium leuzeanum Gaud., 1827.
Nephrodium leuzeanum Hk., HKBK. 295, 1862.
Dryopteris leuzeanum O. Ktz., 1891.

Caudex subarborescent, densely scaly at the crown; stipes 60-90 cm. long, stout, striated. Fronds 1.33-2 m. long, subdeltoid, pinnate; pinnae 30-4.5 cm. long, 15-18 cm. broad, simple, or the lowest with 2-3 large pinnated pinnules on the lower side; segments 7.5-10 cm. long, 2-3 cm. broad, with oblong subfalcate, entire or sinuated lobes reaching down a broadly-winged rachis; veins pinnate in the lobes; sori copious, /usually in close single rows in the lobes.

N. India, Philippine Malaccas, Fiji. Samoa, Hongkong, China: Kwantung, Hainan.

A variable plant, of which Presl. and others made
several species
(P. 183).
20. *Aspidium giganteum* Blume, Enum. 159, (1828).

Nephrodium giganteum Baker, 1874.
Pleocnema trimani Bedd., 1883.
Aspidium trimenum Diels, NPFL. 188, 1899.

Stipes 30-60 cm. long, glossy, chestnut brown. Fronds 60-90 cm. long, 30-44 cm. broad, deeply pinnatifid at the apex, with lanceolate sinuated lobes, below thin 4-6 pinnae on each side, the lowest much the largest, often 30 cm. long, pinnate at the base,/ with deeply pinnatifid pinnule; texturepapyraceo-herbaceous; rachis and both sides naked; veins anastomosing principally in costal arches; sori large, terminating free veins, principally in rows on the lobes on both sides of main veins.

Ceylon, Philippine, Malayas, China.

Resembling A. cicutarium in habit, but the texture is thicker and the venation much less compound.

21. *Aspidium membranifolium* (Presl.) Kze. Bot. Zeit. 261,
(1848); Mett. n. 270; NPFL. 188; Matthew 343, (1911).

Nephrodium membranifolium Presl., 1825.
Aspidium fuscipes Wall., 1825.
Nephrodium dissectum Desv., HKBK. 282.
Sagenia membranifolia Christ, 1902.

Stipes tufted, 30 cm. long or more long, rather slender, glossy, clothed with linear dark-brown scales towards the base. Fronds 45 cm. long, 1/3-1 m. broad, deltoid; lower

pinnae varying from simply pinnatifid, with broad blunt lobes to 30 cm. long with simple pinnatifid pinnules, the centre usually uncut for a breadth of 0.6-1.3 cm. and the uncut bluntish or acute ultimate divisions as broad; color bright green; texture papyraceous-herbaceous; rachis and both surfaces nearly naked; sori ~~pp/p~~ co/pious, generally submarginal; involucre flat, 1-1.7 mm. broad.

North India, Philippine, Samoa, Ceylon, S. W. Asutralia, Madagascar, China: Kweichow, Yunnan.

11. Aspidium singaporianum Wall., HK and Grev. Ic. Fil. t. 26. (1827); Mett. n. 293; Christ 277; NPFL. 183; Matthew 343, (1911).

Podopeltis singaporianum Fee! 1850-52.
Nephrodium singaporianum Baker, HKBK. 296, 1867.
Dryopteris singaporianum O. Ktz., 1891.

Rhizomes creeping; stipes subtufted, those of the fertile fronds 15-30 cm. long. Fronds 30 cm. or more long, 5-10 cm. broad, oblong, entire, acuminate at the apex, narrowed rather suddenly and then decurrent gradually towards the base; textu~~p~~re papyraceo-herbaceous or subcoriaceous; primary veins distinct nearly to the edge; areolae copious, with free included veinlets, sori numerous, close 4-6 in a line between the main veins.

Malayan peninsular, 1 China.

23. Aspidium trifoliatum (L.) Sw. Schrad. Journ. 1800^2. 30 (1801); HKBK. 258; Christ 277; NPFL. 185.

Polypodium trifoliatum Linn., 1253.
Tectaria trifoliatum Cav., 1802.
Bathmium trifoliatum Link, 1841.
Aspidium fimbriatum Willd., 1810.
(P. 183).

Stipes tufted, 30 cm. or more long, brownish, scaly only at the base. Fronds 30-45 cm. long, 15-30 cm. broad, with a large ovate-acuminate terminal pinna, narrowed or forked at the base, and 1 or 2 lateral ones on each side, the lowest mostly ~~n~~ forked; texture papyraceo-herbaceous; primary veins distinct to the edge; areolae fine, copious, with free included veinlets; sori in rows near the main veins; induciums 2 mm. broad, orbicular, peltate.

Tropical America, Mexico, Brazil, Peru, China: Hainan.

New to China.

24. Aspidium devexum Kze. Bot. Zeit. 259, (1848); Matthew 342, (1911).

Aspidium membranaceum Hk., HMBK. 259, 1864; NPFL. 188.
Aspidium giganteum var. minor Hk., 1862.
Sagenia membranacea Bedd., 1870.

Stipes tufted, about 30 cm. long, nearly naked, with a few spreading linear scales below; fronds 45-60 cm. long, 30 cm. broad; lower pinnae much the largest, subdeltoid, 15-20 cm. long, 7.5-10 cm. broad, pinnules on lowest side much larger than the others with lanceolate-pinnatifid segments, with small oblong, sinuate lobes; texture thinly herbaceous; color pale-green; veins anastomosing principally in costal arches; sori copious, principally marginal in the lobes, indusium truly peltate.

Ceylon, Java, Philippines, Formosa, Loochow, China:

25. Aspidium rheosorum (Baker) C. Chr. Ind. 90, (1905).

Polypodium rheosorum Baker, JOB. 363, (1884) non 1881.

Stipes naked, castaneous, fragile, 15 cm. long; lamina deltoid, moderately firm in texture, green, and glabrous on both surfaces, 20-23 cm. long and as broad with a deeply pinnatifid deltoid apex with large lanceolate segments, and a single pair of free, shortly-petiolate lateral pinnae with short lobes on the upper and the larger ones on the lower side, veins anastomosing copiously into hexagonal areolae with copious free included veinlets, sori very irregular in size and shape, sometimes of 1-2 sporangia only, sometimes of a globose mass on the tips of free veinlets but sometimes forming irregular masses on the anastomosing veins. Habit of Aspidium trifoliatum.

Costa Rica, China: Chekiang.

26. Aspidium griffithii (Moore) Diels, NPFL.196, (1899); Matthew 315, (1911).

Dictyoline griffithii Moore, Ind. LIX, (1857).
Hemionitis griffithii Hk. f. et Thoms., SFB. 200; Christ 62.
Hemionitis wilfordii Hk., 1859.
Gymnogramme griffithii Hance, 1867.

Stipes 20-30 cm. long, scaly towards the base, villose throughout. Fronds 30 cm. or more long, 15-25 cm. broad, subdeltoid, pinnatifid or pinnate with 2-4 distinct pinnae on each side, which are 7.5-10 cm. long, 2.5-3.8 cm. broad, entire or crenate, acuminate, the lower ones stalked; texture herbaceous, thick; rachis and both sides villose; main veins barren and pinnate, the veinlets fertile and copiously

reticulate, rarely with included free veinlets.

Khasya, Tonkin, Formosa, Japan; China: Kwantung, Kweichow, Yunnan, Chekiang - Yuan-tang Shen.

Tribe V. Davallieae

Sori roundish, oblong or linear, rarely medial on the vein but more generally submarginal and then solitary and terminal on the vein tips or uniting the apex of 2 or more veins or veinlets. Indusium more or less of the same shape, attached at the inner side of the sorus, opening outwardly, very rarely wanting. Stipes whether or not articulate to the rhizome. Fronds 1 or more times pinnate; segments acroscopically auriculated.

Key to Genera

1. Pinnae or ultimate pinnules dimidiate, i. e. the half on the lower side of the midrib cut away...27. Lindsaya

1. Pinnae or ultimate pinnules not dimidiate.

2. Sori often confluent the indusium un-interrupted........ ....28. Schizoloma

2. Sori mostly not confluent, the indusia distinctly free from each other.

3. Pinnae articulated to the rachis.

4. Climbing fern; fronds articulated to the rhizome.... ....29. Arthropteris

4. Not climber; fronds not articulate to the rhizome... ....30. Nephrolepis

3. Pinnae not articulated to the rachis.

4. Sori marginal; indusium fastened at the base only..............................31. Humata

4. Sori marginal or submarginal; indusium fastened at the base and sides, opening at the outer edge..........................

5. Rhizome scaly, scales often hairy-pointed at the, not minute. Stipes articulated to the rhizome... ....32. Davallia

5. Rhizome hairy, fibrillose or minutely scaly. Stipes not articulated to the rhizome.

6. The soriferous margin not modified, usually longer than the indusia and coalescent.

7. Ultimate segments cuneate; sori roundish or transversally oblong...................... ....33. Odontosoria

7. Ultimate unequal-sided, rhomboidal or linear-triangular in outline; sori roundish or vertically oblong...34. Microlepia

6. The soriferous margin modified, as long as the indusium and growing together into distinct cup-shaped involucre.......35. Dennstaedtia

4. Sori not submarginal, but in the middle of teeth; indusium wanting. Rhizome hairy.................. ....36. Monachosorum

27. Lindsaya Dryander; J. Smith, Mem. Acad. Turin.
5. 413, (1793); Dry Tr. Linn. Soc. 3. 39,
(1797).

Type: L. trapeziformis Dry.

Sori linear, continuous or interrupted, along the margin of the frond-segments, placed at the apex of, and uniting two or more veins; indusium longitudinal, double, opening extrorsely along the margin of the
(P. 185.).
frond, the inner valve membraneous, the outer formed of the more or less changed margin of the frond; fronds pinnate or bipinnate very rarely simple (not in Chinese species), costa excentric or obsolete, pinnae dimidiate, veins radiatly forked, free, thin, apex combined by an elongated named in honor of Archibald Lindsay, an early English botanist).

A fairly extensive genus of about 150 species, mostly in tropics of both hemispheres, 6 recorded from China.

The species of the genus are mostly characterized by one-sided pellucido-herbaceous or coriaceous pinnae, approximating in shape to a quarter of halve of a circle.

Key to species.

I. Veins free.
  A. Frond simple pinnate.........................1. L. cultrata
  B. Frond bipinnate.
    1. Pinnae orbicular, deeply dissected..2. L. chinensis
    2. Pinnae triangular-rhomboid.
      a. Frond bipinnate only in the lowest portion.........
      ....3. L. orbiculata
      b. Frond bipinnate throughout, except the uppermost part..............................4. L. Chienii
II. Veins anastomosing
  A. Pinnules shallowly and broadly lobed..5. L. decomposita
  B. Pinnules cut more than half way into narrow lobes.........
  ....6. L. tenuifolia

1. Lindsaya cultrata (Willd.) Sw. Syn. 119, (1806); HkBk. 105. (pt.); Christ. 291; Mak. 221; Matthew 371, (1911).

Adiantum cultrata Willd., Phytogr. 14 t. 10 f. 2. 1794.
Lindsaya apiculata Kze., 1846.
Davallia trachyporpa Baker, 1874, HkBk. 468.

Rhizomes short-creeping; stipes wiry, flexuose, 7.5-15 cm. long; fronds 15-30 cm. long, about 2.5 cm. broad, simple pinnae 1.2-1.8 cm. long, 6 mm. deep, not imbricated, the lower margin straight or slightly curved, usually upward, the upper edge slightly lobed, so that the continuity of the line of the fructification is broken, sometimes nearly entire,

lower pinnae stalked; texture coriaceo-membraneous.

N. India, Malayas, Bourbon, Formosa, Korea, Japan, Hongkong, China: Szechwan, Yunnan, Kwantung, Kweichow.

Var. japonica, Hooker, Hdbk. 105 (1873). Christ, Bull. Geogr. Bot. Man. xviii. 159, (1909).

Fronds 5-7.3 cm. long; pinnae nearly triangular with the point at the base, upper edge nearly entire.

Japan, Corea, China:

2. *Lindsaya chinensis*, Ching, Sinensia 1: 5 (1929).

Rhizome creeping, about 3 mm. thick, paleae dense, spreading, dark shinning brown, linear with rather a blunt apex, 1-1.5 mm. long. Stipes more or less approximate, 4-10 mm. apart, slender, glabrous throughout, dark shinning chestnut brown and become lighter upward, to 9 cm. long, and 1 mm. thick at base. Fronds deltoid-lanceolate, 10-16 cm. long, about 5.5 cm. broad at base, 1.2-1.8 cm. broad in the middle, (P. 185).
glabrous bipinnate in the lower one-third, the remaining upper two-thirds simple pinnate, or sometimes the whole frond simple pinnate pinnate, gradually diminiate towards apex, pinnae spreading patent, petiolate alternate, the lower 3-6 pairs oblong lanceolate, 2-3 cm. long, 6-10 mm. broad, pinnate under a pinnatifid rather blunt apex; pinnules 5-8 pairs, almost equilateral triangular, petiolulate, cuneate at base, cut on the rounded outer margin at out 1/3 way down into 2-4 short broad more less dilated segments with a blunt or more or less erosed or truncate apex, the upper ones often subentire, to 4 mm. long, about as broad; the upper pinnae numerous (about 22-30 pairs), reniform to flabellate-cuneate, to 1 cm. long and as broad, variously cut along the rounded outer edge into 4-6 oblong more or less dilated segments which are often again bifid and of the same shape as, but larger than, those in the pinnules of lower pinnae. Rachis slender, terete, more less channelled above, light green, except the lower part which is dark stramineous-brown, glabrous; veins slender, free, rather distinct, flabellate, mostly once-forked or simple, 1-2 (never 3) to each ultimate segment; texture pellucido-herbaceous, thin, but rigid. Sori orbicular to transversal-oblong, one to each segment, terminating 1-2 veinlets, indusium membranaceous, pale green, margin subentire or bifid, failing quite way short of the margin of segments.

This is one of the very distinct species of the genus. In habit it resembles L. orbiculata Mett; but from which it can be distinguished at once by its finely-cut pinnae, very short sori etc.

Kwangsi.

3. Lindsaya orbiculata (Lam.) Mett; Kuhn, Ann. Lugd. Bat. 4. 279, (1869); NFFL. 221, Matthew 371, (1911).

Adiantum orbiculata Lam., Enc. I. 41. 1783.
Lindsaya flabellulata Dry., Tr. Linn. Soc. 3. 41 t. 8. f. 2. 1797; HKBK. 107; Christ 292.
Lindsaya javanensis Bl., 1828.
Davallia trichomanoides Bedd., 1856, non Bl. 1828.
Davallia chilophylla Baker, 1874 HKBK. 468.

Rhizomes short creeping; stipes wiry, brownish black, polished without scales, 2.5-30 cm. long. Fronds usually simple pinnate, occasionally bipinnate in the lower portion, tufted, the outer sterile ones spreading, 5-7.5 cm. long, the inner ones fertile and erect, 15-45 cm. hight segments numerous, nearly sessile, obliquely fan-shaped, 6-12 mm. long, about 6 mm. seldom above 12 mm. broad, the lower line nearly straight or decurved, the upper rounded, entire, or lobed, the apex broadly rounded, texture pellucido-herbaceous; the veins dichotomous or flabellate, starting from the base with a midrib; sori in continuous line all around the outer margin, except when interrupted by the lobes. Sterile segments acutely denticulate.

A very variable species in size of pinnae and ramification.

Australia, Ceylon, India, Malayas, Formosa, Hongkong, China: Hainan, Kwantung, Fukien, Kwangsi.

(P. 187).
4. Lindsaya Chienii Ching, Sinensia 1: 4 (1929).

Rhizome moderately wide-creeping, oblique-ascending, 1.5-2 mm. thick, thinly covered by small appressed subulate ferruginous scales; stipes subcaespitose, slender, 15-26 cm. long, grooved above, polished dark chestnut brown, and so as the rachis, rarely sparcely scaly near the base, otherwise glabrous in all parts. Fronds oblong deltoid, 11-14 cm. long, about 7 cm. broad at base, bipinnate, with a short simple pinnate apex; the basal pinnae much the largest, 5 cm. long, 2 cm. broad, pinnate, the upper ones gradually smaller and less compound, subsessile, alternate, erecto-patent, the lower 4-6 pairs pinnate, oblong lanceolate with an acuminate pinnatifid apex, secondary rachis castaneous beneath; the pinnules subsessile, oblique rhomboid with basal ones often suborbicular, cuneate, cut on the outer and upper margin into few broad short truncate soriferous lobes, entire and straight on the lower and inner sides, 1-1.2 cm. long, 5 mm. broad, alternate, 5-6 pairs in the basal pinnae; the terminal pinnae are of same shape and size; texture thin herbaceous, light green above, paler below, rather pellucid, midrib distinct only in larger pinnules, veins all free, more or less flabellate, translucent, 1-2 forked. Sori 3-7 on each pinnule,

short, not confluent, submarginal, transversally linear-oblong, mostly uniting the apices of two veins, but not uncommon apical on single veins, inducium membranaceous, narrow, grayish.

In habit this species closely resembles the bipinnate form of L. Media Hooker from Tropical Australia, but differs in more lobed pinnules discontinued sori and always free veins.

5. Lindsaya decomposita Willd. Sp. 5. 425, (1810).

Lindsaya lobata Poir, 1813; HMBK. 11, 471; Christ 293; NFPL. 221.
Schizoloma decomposita Bedd., 1876.
Lindsaya nitens Bl., 1828.
Lindsaya intermedia Bl., 1846.
Lindsaya propinqua Hooker, 1855.
Schizoloma malabaricum Bedd., 1868, HMBK. 471.

Rhizomes short-creeping; stipes 15-25 cm. long, firm, erect; frond simple or with a long unbranched apex, and 1-6 pairs of erect-patent branches 7.5-15 cm. long; pinnules about 1.2 cm. long, 6 mm. broad, the lower decurved principally at the base, the outer margin rounded, the upper three or four times broadly not deeply lobed, close-placed, but not imbricated; texture thinly pellucido-herbaceous; veins anastomosing in the upperhalf of the lobes; sori marginal in the lobes; the inner valve of the involucer narrow and membraneous, the edge of the frond produced beyond it and scarcely altered.

Tropical Australia, Polynesia, China: Hainan, Kwantung.

6. Lindsaya tenuifolia Bl. Enum. 219 (1828).

Acrophorus tenuifolia Moore, 1857 (pt.).
Odontoloma tenuifolia J. Sm., 1865.
Lindsaya tenuifolia Mett.; Christ 294; NFPL. 222.
Rhizomes creeping fibrillose; stipes strong, erect, 10-1 cm. long, fronds with 2-7 pairs of pinnae and a terminal one; lateral pinnae spreading with subrigid rachises, 7.5-10 cm. long, 1.2-18 cm.
(P. 188.).
broad; pinnules cut down on the upper side into narrow simple or forked linear segments to a nearly straightly flattened leafy rachis; texture pellucido-herbaceous, both surfaces naked; sori small, terminal on the segments; involucre sub-orbicular.

Java, Polynesia, Malesia, China: Kweichow.

New to China.

28. Schizoloma Gaudichaud, Ann. Soc. Nat. 3. 507, (1824).

Type: Schizoloma cordatum Gaud.

Sori linear or linear-oblong, continuous, uniting the apex of many veins, indusium of the same shape, attached at the inner, side of the sorus, opening outwardly. Fronds simple or generally pinnate, pinnae equal-sided or unequal-sided but not dimidiate, oblong or linear-lanceolate; costa central; veins free, forked; veinlets anastomosing, forming oblique elongated areolae, transversely combined by the elongated receptacle along the margin. Rhizomes mostly short. (Greek "Schizo" - I cut, "loma" - margin).

Sp. about 25, chiefly in tropical and extra-tropical regions of the world.

Most closely related to Lindsaya from which the present genus differs only by veins being more or less anastomosing.

Key to species

1. Frond simply pinnate throughout; pinnae linear-lanceolate, entire.................................1 *S. ensifolium*
1. Frond simply pinnate with the lower pinnae usually once more pinnate or pinnatifid; sterile pinnae shallowly serrate...............................2. *S. heterophylla*

1. *Schizoloma ensifolium* (Sw.). J. Sm. FoB. 5. 414, (1841); BPFL. 219; Matthew 390, (1911).

Lindsaea ensifolia Sw., Schrad. Jour. 1800^2. 77, 1801; HKBK. 112; Christ 297.
Lindsaea pentaphylla Hk., 1844.
Schizoloma pentaphylla Fee, 1850-52.
Lindsaea lanceolata Lab., 1806.
Adiantum lanceolatum Wild.; 1810.

Rhizomes creeping, stout, paleaceous; stipes 15-30 cm. long, wiry, flexuous; fronds 15-30 cm. long, 7.5-10 cm. broad, with a linear-lanceolate simple or pinnatifid point, simply pinnate below; pinnae usually in many pairs, rarely reduced to one all stalked, 3.7-15 cm. long, 6-12 mm. broad, varying from linear-acuminate to lanceolate in shape, only the sterile ones, which are broader than the others, a little toothed; texture herbaceous; veins conspicuously anastomosing; sori in a continuous marginal line.

Tropical Asia, India, Borneo, Queensland, Hongkong, China: Hainan, Kwantung.

(P. 189).
2. *Schizoloma heterophyllum* (Dry.) J. Sm. FoB. 5. 414, (1841); BPFL. 219; Matthew 390, (1911).

Lindsaea heterophylla Dry., Tr. Linn. Soc. 3. 41 t. 8. f. 1 1797; HKBK. 112; Christ 298.

Lindsaea variabilis Hk. et Arn., 1836-40.

Rhizomes short; thick, horizontal. Fronds erect, slender but stiff, 1.8-3.7 cm. high, usually bipinnate in the lower portion, primary pinnae numerous, the lower ones when pinnate often ~~5~~7.5-10 cm. long, with the lower segments short and rhomboid and ending in a lanceolate undivided ones or sometimes all the pinnae lanceolate, and undivided, but then never more than 5 cm. long and usually much less; veins proceeding from midrib, forking and anastomosing almost as in *S. ensifolium*, excepting in the shortened lower pinnae where they are often dichotomous from the base as in *Lindsaya flabellulata*.

In woods and shady places; Philippine Islands, India, Hongkong, China: Kwantung.

29. Arthropteris J. Smith in Hook. Fil. Fl. N. Zeal. 2. 43, (1854).

Type: Polypodium tenellum Forst.

Sori roundish terminal on the anterior veinlets of once-forked veins; indusium roundish-reniform, fixed by the sinus. Fronds pinnate; pinnae articulate to the rachis; rhizomes creeping or scandent; stipes articulate to the rhizome.

A small genus, very near Nephrolepis, from which it differs in having articulate stipes.

Sp. about 5, mostly in tropical Asia; the following recently recorded from S. E. China.

Arthropteris obliterata (R. Br.) J. Sm. Cat. Cult. Ferns 62, (1857); Bedd. Ferns Brit. Ind. 56, Matthew 242 (1911).

Nephrodium obliteratum R. Brown, Prod. Fl. N. Holl. 148, 1810.
Nephrolepis ramosum Moore, 1858; HKBK. 301; Christ 288.
Arthropteris ramosa Mett., 1870; BFBI. 205; Journ. Coll. Sci. Tokyo XXII, 5[illegible]7 (1906).
Nephrodium trichomanoides J. Sm., 1841.
Polypodium beckleri Hk., 1862.
Arthropteris beckleri Mett., 1870.

Caudex very long-creeping filiform, here and there subsquamoso-tomentose, rooting with few short-fibres; stipes scattered, short, 2.5-5 cm. long, and as well as rachis dark brown, subpubescent. Fronds 8-35 cm. long, oblong or linear-oblong, membranaceous, invariably black when dried simple pinnate, pinnae from 1.3-3.7 cm. long, horizontal patent, rather distant, [illegible]-oblong, obtuse or acute, rarely acuminate, obliquely cuneate at the base, sessile, straight or subfalcate, superior base truncate, and parallel with the rachis, frequently with sharp auricle, the margin entire or crenate or lobato-dentate especially in the fertile pin-

nae; costa slender, flexuose, veinlets forked, upper branch bearing sori at the apex, a little distant from the margin; indusium small, cordato-reniform, soon obliterated.

Australia, Africa, Tropical Asia, through Malaysia and Polynesia to Formosa and S. China: Hainan, Kwangsi.

This genus is new to China, ([illegible] 1931).

(P. 190).

30. Nephrolepis Schott. Gen. Fil. t. 3. (1834).

Type: *Aspidium biserratum* Sw.

Sori round or reniform, prominent, submarginal or medial in a single row on each side of the midrib, terminal on the anterior veinlets or at the once-forked veins, or marginal and meeting the apices of two or more veins; indusium reniform, attached by the sinus, the lobes often meeting or overlapping, the indusium then becoming round or peltate, opening all around the edge or nearly so, or 2-valved and marginal at the inner side, opening outward. Fronds linear-lanceolate or oblong, simple pinnate; rootstocks erect, creeping or climbing often stoloniferous, the stipes not jointed to the rootstocks, the pinnae articulated to the rachis. (Greek "Kidney" and "Scale", allusion to the shape of the indusium).

Species about 25, terrestrial or epiphytic, inhabiting tropical countries of both hemispheres; 6 are recorded in China.

Key to species.

1. Indusium reniform or horseshoe-shaped.
  2. Pinnae 10-20 cm. long, acuminate; sori marginal in the teeth..........................1. *N. acuminata*
  2. Pinnae under 7.5 cm. long, not acuminate; sori marginal or submarginal, not in teeth.
    3. Rhizome tuberiferous; pinnae rounded or blunt at apex, auricled, broadly cordate and imbricate at base; sori submarginal....2. *N. cordifolia*
    3. Rhizome not tuberiferous; pinnae not cordate at base; sori marginal.
      4. Rhizome wiry, creeping; barren pinnae bluntly rounded; sori somewhat immersed.......................................3. *N. radicans*
      4. Rhizome not wiry, nor climbing; pinnae acute at apex; sori not immersed..4. *N. exaltata*
1. Indusium roundish.
  2. Pinnae 15 cm. long; sori placed almost midway between midrib and margin; plant glabrous.......................................5. *N. biserrata*

2. Pinnae half as long, sori marginal; rachis and frond villose..........................5. N. hirsutula

1. Nephrolepis acuminata (Houtt.) Kuhn, Ann. Lugd. Bat. 4. 286, (1869).

Ophioglossum acuminatum Houtt., Nat. Hist. 14. 94, 1783; ed. Germ. Pfl. Syst. 131. 53 t. 94. f. 2. 1786.
Aspidium davallioides Sw., 1801, Schrad. Journ. 1800^{2} 33.
Nephrolepis davallioides Kze., 1848, Hook. 302; Christ 289; HKBL. 207.

Caudex short, stoloniferous; stipes tufted, 30 cm. or more long, scaly towards the base; fronds drooping, 60-90 cm. long, 30 cm. or more broad; lower pinnae barren, 10-20 cm. long, 1.2-2.5 cm. broad, the apex acuminate, the edge inciso-crenate to a depth of 2 mm. or less, fertile pinnae narrower, the lobes deeper and bearing each a single sorus at the point; texture subcoriaceous; rachis furfuraceous, both sides nearly naked; indusium reniform.

Distinct by its pinnatifid fertile pinnae, with the sori at the tip of the lobes.

Java, Hongkong, China: Kwantung.

(P. 191).
2. Nephrolepis cordifolia (L.) Presl. Tent. 79, (1836); Hook. 300; Christ 290; HKBL. 206; Matthew 374, (1911).

Polypodium cordifolium L., 1753.
Aspidium cordifolium Sw., 1801.
Aspidium tuberosum Bory., 1810.
Nephrolepis tuberosa Presl., 1836.
Nephrolepis pluma Moore, 1878.

Fronds tufted, erect, from a short suberect rootstock, the wiry fibrous roots often bearing tubers. Stipes 5-15 cm. long, glabrous or more usually clothed with soft slender pale brown paleae. Fronds 15-60 cm. long, 2.5-6 cm. wide, lanceolate, narrowed at both ends, the pinnae numerous, close, sessile, often imbricate, toothed to subentire, oblong, 5-8 mm. wide, inequilateral, the base cordate or rounded on the lower side and auricled on the upper side. Sori large, in a single row midway between the midrib and the margin (nearer to the margin); indusium broad, reniform, opening towards the apices of the pinnae.

A species widely dispersed all over the tropics of the world. Kweichow, Kwantung, Fukien, Chekiang.

A favorite green house fern, much used for house decoration, very graceful on account of its long sword-like tapering, arching, airy green fronds.

3. *Nephrolepis radicans* (Burm.) Kuhn, Ann. Lugd. Bat. 4, 285. (1768).

Polypodium radicans Burm., Fl. Ind. 233 t. 66 f. 3 1768.
Nephrolepis volubilis J. Sm., 1841; Christ 288; HFCL. 207; (HKBL 301).
Lepidoneuron volubilis Fee, 1850-52.

Rhizomes long wiry, up to 17 m. over trees, destitute of tubers, scales lanceolate, entire or hardly ciliate, castaneous with a ferruginous at apex or the fertile ones more acute and not rarely more or less falcate, resembling those of N. exaltata but smaller and the sori somewhat immersed.

Tropical Asia, China: Kweichow.

New to China.

4. *Nephrolepis exaltata* (L.) Schott. Gen. Fil. t. 3, (1834); HKBL. 301; Christ 289; HFCL. 207; Matthew 374, (1911).

Polypodium exaltatum L., Syst. Nat. 10. 2. 1326, 1759.
Aspidium exaltatum Sw., 1801.
Nephrodium exaltatum R. Br., 1810.

Stipes tufted, 10-15 cm. long, firm, naked, or slightly scaly; frond 30-60 cm. or more long, 7.5-15 cm. broad; pinnae close, 3.7-5 cm. long, 6-12 mm. broad, usually acute, the edge entire~~ly~~ or slight crenate, the upper side auricled, the lower rounded at the base, usually acute at apex; texture subcoriaceous, rachis and both sides nearly naked; sori submarginal; indusium firm, distinctly reniform, fixed at the deep sinus or sometimes becoming regularly peltate.

Cuba, Mexico to Peru, Brazil, Polynesia, N. India, Queensland, Ceylon, Formosa, Hongkong, China: Fukien, Chekiang, Kwantung.

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5. *Nephrolepis biserrata* (Sw.) Schott. Gen. Fil. ad t. 3, (1834); Matthew 374, (1911).

Aspidium biserratum Sw., 1801, Schrad. Journ. 1800² 32.
Nephrolepis acuta Presl., 1836; HKBL. 301; Christ 289; HFCL. 207].
Nephrolepis splendens Presl., 1836.

Stipes tufted, 10-20 cm. long, firm, naked or slightly scaly; fronds 2/3-1.33 m. long, 20-30 cm. broad; pinnae 10-20 cm. long, 1.2-2.5 cm. broad, acute, the // edge entire or slightly crenate, the upper side auricled, the lower rounded at the base, shortly petiolate; texture subcoriaceous~~A~~,

rachis and both sides nearly naked; sori submarginal; indusium suborbicular, subpeltate.

Formosa, Loochoo to Queensland, Natal, Guinea Coast, Hongkong, China: Kwantung.

This species is almost identical with the Nephrolepis exaltata in distribution.

6. Nephrolepis hirsutula (Forst) Presl. Tent. 79, (1836); Matthew 374, (1911).

Polypodium hirsutulum Forst., Prod. 81, 1786.
Aspidium hirsutulum Sw., 1801.
Polystichum hirsutulum Bernth., 1802.

Rootstock erect, stout, densely covered with appressed, dark-brown scales, stoloniferous, also with few pro-roots. Stipes tufted, 10-40 cm. long, scaly at the base, more or less villous above, becoming nearly glabrous. Fronds 60-120 cm. long, 4-15 cm. wide; pinnae somewhat falcate, acute or acuminate, subentire, toothed or somewhat crenate, the base rounded on the lower side, prominently auricled on the upper side, more or less villous on both surfaces, becoming subglabrous, the sterile pinnae shorter than the fertile ones. Sori marginal or submarginal, about 1 mm. in diameter, indusium peltate or subreniform.

Philippines, other tropical countries of Asia, Hongkong, China.

Chiefly distinguished from N. exaltata by its rachis densely and both surfaces of fronds more or less coated with ferruginous downs.

31. Humata Cavanilles Descripc. Plant. 272, (1802).

Type: Adiantum repens L. fil.

Sori marginal or intramarginal, globose or elongated; indusium ample, coriaceous, suborbicular or reniform, attached by a broad base, the apex and sides free. Fronds coriaceous, usually deltoid, 7.5-15 cm. long, more or less distinctly dimorphous, the sterile ones barely more than once pinnatifid, fertile ones often 3-4 pinnatifid. Rhizomes creeping, scaly. (Latin, "the earth" referring to the creeping habit of the rhizomes)

Some 26 species are known, mostly from the East Indies. Usually forms of small size with thick small deltoid fronds, closely related to Davallia in which sometimes included which however, has semicylindrical or half- cup-shaped indusium hinged to the frond on two lateral sides as well. [illegible] are known from China.

Key to species.

(P. 193).

1. Plant large; frond tripinnatifid, i. e. the pinnules again deeply pinnatifid both pinnae and pinnules free and petiolate..............................1. H. tyermanni
1. Plant small; frond bipinnatifid, i. e. the adnate pinnae more or less pinnatifid, or merely crenate, adnate.....................................2. H. repens

1. Humata tyermanni Moore Gard. Chr. (1871) 870 f. 178; NPFL. 209; Matthew 370, (1911).

Davallia tyermanni Moore, Hk. Ic. 1680; HBK. 467.

Above-ground rhizomes stout, long-creeping, densely clad in scales appressed, lanceolate, ferruginous or whitish; stipes strictly erect, naked, 5-7.5 cm. long; fronds deltoid, 3-4-pinnatifid, subcoriaceous, glabrous, 7.5-15 cm. long, 7.5-10 cm. broad, primary rachis slender, lowest pinnae much the largest, deltoid at the base, the others are ascending, cuneate-truncate at the base, pinnules oblong, deeply pinnatifid, base attenuate, ultimate segments obtuse or horn-like; sori medial on the segments of the pinnules, terminating the veinlets; indusium orbicular, coriaceous, free along the margin;

China: Chekiang, Kiangsi, Kiangsu.

Resembling Davallia bullata, but the sori and indusium are entirely different.

2. Humata repens (L. fil.) Diels, NPFL. 209, (1899); Matthew 369, (1911).

Adiantum repens L. fil., Suppl. 446, 1781.
Humata pedata J. Sm., Jo. 3.~~41~~ 416 (1841).
Davallia pedata Smith, 1793; HBK. 89; Christ 304.
Davallia alpina Bl. 1828, HBK. 89; Christ 304.
Humata alpina Moore, 1857; NPFL. 209.

Rhizomes creeping to a considerable length, covered with brown scales; stipes 5-10 cm. long, rather scaly; fronds 5-10 cm. long, 3.7-5 cm. broad at the base, deltoid in general outline, cut down nearly to the rachis; upper segment linear-oblong, acute, erecto-patent, inciso-dentate, the lower pair broader, deeply inciso-pinnatifid, especially on the lower side; texture coriaceous; veins forked; coalescing into a central one not more prominent than the branches; sori placed in two rows close to the margin, towards the ends of segments.

Malayan Peninsula, Borneo, Java, Queensland, Japan, Formosa, Hongkong, China: Kwangtung, Kwangsi.

32. Davallia Smith Mem. Acad. Turin. 5. 414, (1793).

Type: Davallia novae-zelandiae Col.

Sori inserted at the end of transversal veins at or very near the margin, half cup-shaped, globular or elongated; indusium coriaceous, more or less semicylindrical cup-shaped, urceolate or tubular, attached at the vertical base and lateral sides but with an opening at free truncate top, next to the margin of the frond. Rhizome usually creeping densely covered with narrow brown usually chaffy scales. Stipes not jointed to the rootstocks. Fronds generally ovate or deltoid in outline, in most species quadri- or tripinnate rarely bipinnate rarely bipinnate; texture often coriaceous. Veins forked and diverging from a more or less prominent midrib, venules free, the fertile ones often shorter with terminal receptacles. (In honor of Davall).

Species about 67, most epiphytic or terrestrial ferns of mostly small size and finely divided foliage but diverse habit, widely disper-
(P. 194).
sed in warm and tropic parts of the Old World. 17 species are known in China.

Key to species.

1. Indusium as long as broad or broader, suborbicular or reniform. (like that in Humata).
2. ovate or ovate-oblong, the lower ones scarcely longer than the upper ones.
3. Frond bipinnatifid, texture thin herbaceous....... ....1. *D. membranulosa*
3. Frond tripinnatifid, texture subcoriaceous....... ....2. *D. assamica*
2. Fronds deltoid or oblong-deltoid, the lower pinnae much longer than the upper ones.
3. Texture coriaceous.
4. Rachis scaly, indusium much broader than the soriferous lobes..............3. *D. perdurans*
4. Rachis glabrous, indusium not broader than the soriferous lobes.
5. Lower pinnae deflexed, frond 4-pinnate..... ....4. *D. yunnanensis*
5. Lower pinnae not deflexed, frond tripinnate.
6. Lower pinnule at the base of the lowest pinnae much the largest; ultimate segments much longer than indusium.
7. Sori large, broad, placed nearer to the apex..............5. *D. griffithiana*
7. Sori much smaller, placed nearer to the base of segments..6. *D. henryana*
6. Lower pinnules at the base of the lowest pinnae similar to the others, ultimate segments only slightly longer than

indusium..................7. D. platylepis
3. Texture thin herbaceous or flaccid.
4. Frond bipinnate..............8. D. multidentata
4. Fronds tri- or quadripinnate.
5. Rhizome hypogaeous, ultimate pinnules broad and blunt..................9. D. immersa
5. Rhizomes mostly subterranean, ultimate pinnules or segments linear-ligulate.
6. Rhizome short repent; frond below 10 cm. long ....10. D. pulcherrima
6. Rhizome wide-creeping; fronds much larger.
7. Scales on the rhizome ovate to lanceolate.
8. Basal pinnae with broadly produced on the lower side...................
.................11. D. rigidula.
8. Basal pinnae at best slightly produced.
9. Ultimate segments very acute, rhizomatic scales spreading..
..............12. D. pseudocystopteris
9. Ultimate segments less acute, rhizomatic scales adpressed........
..............13. D. clarkei.
7. Scales on the rhizome broadly obtuse.
8. Indusium as broad as the segments......
.................14. D. pulchra
8. Indusium broader than the segments.....
.................15. D. [illegible]
4. Frond 5-8-pinnate, otherwise similar to D. pulchra..
..............................16. D. delavayi
1. Indusium longer than broader, cup-shaped or semicylindrical.
2. Sori considerably below the margin of the segments.........
..................................17. D. divaricata
2. Sori marginal or submarginal, often with two unequal horns projecting beyond.
3. Pinnules elliptical-rhombic, crenulate or serrate........
..............................18. D. solida
3. Pinnules pinnatifid half way down towards the rachis.
4. Pinnules 1.5-[illegible] cm. long, regularly 3-6-spino-serrate throughout the margin.........................
..............................19. D. denticulata
4. Pinnules to 13 cm. long, gradually narrowed towards the apex.......................20. D. bullata.

1. Davallia membranulosa Wall., List n. 255, (1828); Hk. Sp. F. 1: 15[illegible]. t. 53 A. (1846): [illegible]. 21; [illegible] 360, (1911).

Acrostichum membranulosum [illegible], 1854.
[illegible] membranulosa [illegible] 1899, [illegible].

Rhizome stout, wide-creeping, densely clothed with lanceolate [illegible] scales; stipes 5-7.5 cm. long; fronds

15-22 cm. long, 5-7.5 cm. broad, lanceolate, once fully pinnate, but the main rachis slightly winged above; lower pinnae lanceolate, 5-7.5 cm. long, 1.2 cm. broad, cut down to a narrowly-winged rachis into numerous sharply-toothed ob- obliquely placed between the costa and margin.

India, China: Yunnan.

4. Davallia assamica (Bedd.) Bak. Syn. 127, (1874).

Acrophorus assamicum Bedd., Ferns Brit. Ind. t. 31. 1866.
Leucostegia assamica J. Sm., 1875.
Davallia [illegible] Ett., Baker Syn. ed. 97.
Humata assamica [illegible], [illegible], 1889.

Rhizome stout, wide-creeping, densely clothed with large lanceolate-acuminate silvery-brown scales; stipes 2.5-7.5 cm. long, naked, stramineous; fronds 15-30 cm. long, lanceolate, tripinnatifid; pinnae crowded, lanceolate, short-stalked, patent, the lowest the largest, all the lowest pinnate truncate at base on the lower side; pinnules crowded, lower oblong, unequal-sided, pinnatifid, upper lanceolate-falcate, entire; texture subcoriaceous; rachises naked, rachis winged in the upper half; veinules immersed, erecto-patent, simple or forked; sori submarginal in the ultimate lobes, with mostly a horn beyond; involucre as broad as deep.

N. India, China: N. W. Yunnan.

Species new to China, according to the identification by Handel-Mazzetti.

5. Davallia [illegible] Christ, Bull. Boiss. t. 97?, ([illegible]); N.F.P. 214; Matthew 356.

Rhizomes stout, thick as a man's finger, creeping, densely clothed with large broadly ovate aristate scales 1 cm. long, 1/3 cm. broad, and patent. Stipes clothed at base with very dense similar scales otherwise only sparsely scaly in other parts, hard and firm, 15 to 25 cm. long, thick as a raven's quill, rufous-brown, remote, texture hard, coarse. Leaves 30-50 cm. long, 15-25 cm. broad, ovato-deltoid, acuminate, quadripinnate, pinnae and pinnules sessile, elongate-deltoid, gradually acuminate, the tertiary pinnules and the pinnules of 4th
(P. 1967).
order linear, deeply cut throughout into acuminate lobes which are 1 mm. broad, [illegible] apex. In latter so often, the lobes almost filiform, thus with a very narrow wing along costa; lateral rachis and less so towards the point of insertion of pinnules conspicuously covered by regular large ovate scales; sori larger than soriferous lobes, which are dilated below the apex and often forked, densely crowded, reddish, rounded, 1 mm. broad; indusium minute, soon spurious, attached by base, whitish.

Yunnan, Szechwan.

4. Davallia yunnanensis Christ, Bull. Boiss. 6. 970, (1898);
Matthew A356, (1911).

A large st~~p~~rong fern; rhizomes woody, thick, horizontal-creeping, covered by obtuse broad scarious gray scales (like in Davallia hymenophylloides Kuhn.), base of stipes clothed with the similar but acuminate scales, otherwise entire plant naked; stipes solitary, 25 cm. long, firm, rigid, thick as a raven's quill, greyish-red; leaves deltoid, acuminate, base almost tripartite, 32 cm. long, 15 cm. broad, quadripinnate, the ultimate pinnae much the longest, the others shorter, petiolate, tri-quatro-deltoid, acute, pinnules pedicellate equally deltoid, the lowest pinnae larger and deflexed, the others erect patent; pinnules of tertiary order shortly pedicellate, oblong; pinnules of 4th order deeply lobulate; lobes 2 mm. long, ovate, with a horn-like often obtuse projection above sori; sori very numerous, placed near the base of lobes, cymbiform, 1 mm. broad, 3 mm. long, broader in the middle, indusium firm, whitish, turgid. A slender plant of almost coriaceous texture, color obscure green.

Yunnan.

5. Davallia griffithiana Hooker, Sp. F. 168 t. 49 B. (1845);
Benth. Fl. Hongk. 462, (1861); HKBK. 95; Crhist 301;
NPFL. 214; Matthew 356, (1911).

Leucostegia griffithian J. Sm., 1875.

Rhizomes stout, clothed densely with pale-brown or whitish linear scales; stipes erect, wiry, 10-15 cm. long; fronds 23-30 cm. long, 10-20 cm. broad, deltoid, tri- or quadripinnatifid; pinnules of the lower pinnae lanceolate-deltoid, 5-7.5 cm. long, 2.5 cm. or more broad; lower segments toothed on the sterile frond, cut down nearly to the rachis in the fertile one, of coriaceous texture; sori very long, (2 mm. broad), cup-shaped submarginal or marginal, with the teeth projecting beyond them.

Formosa, Himalaya, Assam, Malayan Peninsula, Hongkong, China: Chuson amoy, Fukien, Shantung, Chekiang, Yunnan, Kwantung,

Distinguished from all other species of the genus by its large broadly cup-shaped sori.

6. Davallia henryana Baker, Kew Bull. 8, 1906; Matthew 356, (1911).

Rhizomes wide-creeping, 6 mm. thick, paleae ascending, imbricate, linear, scarcely whitish; stipes remote, slender, naked, pale green, 7.5 20 cm. long; lamina deltoid, tripinnate, 7.5-30 cm.

long, rigid, glabrous on both surfaces; rachis slender, naked; upper pinnae lanceolate, lower ones reduced gradually towards the base of the rachis the rachis, cuneate; basal pinnules much larger and inferior ones profoundly pinnatifid; veins visible, immersed; sori solitary, placed nearere to the ultimate segment; inducium orbicular, glabrous, pale, 1
(P. 197).
mm. in diameter.

Yunnan, in mountains.

Differs from Davallia griffithiana Hooker by smaller sori placed nearer to the base ultimate segments.

7. Davallia platylepis Baker, Kew Bull. 229, (1898); Matthew 356, (1911)

Rhizomes slender, wide-creeping epiginous, paleae lanceolate, membranaceous, ascending, ferruginous, faintly white; petioles naked, pale brown, 15-17 cm. long; lamina deltoid, 23-25 cm. long, coriaceous, glabrous on both surfaces, rachis narrowly-winged; lower pinnae much larger than the upper ones, tripinnatifid; pinnae and pinnules cuneate at the lower side of the base; ultimate segments small, unequally oblitary on the ultimate teeth of the segments, inducium orbicular, charataceous, persistent, glabrous 2/3 m. in diameter, attached by base with free margin.

Yunnan.

Differ from European Davallia canariensis Smith by broadly orbicular indusium with free margin, although the fronds are all alike.

8. Davallia multidentata (Wall.) Hk. Mss. HKBK. 91, (1867); Matthew 356, (1911).

Aspidium multidentatum Wall., 1828.
Leucostegia multidentata Bedd., 1876.
Humata multidentata Diels, 1899, NPfl. 209.
Microlepia pteropus Bedd., 1869.

Rhizome stout, wide-creeping, scaly; stipes 10-15 cm. long, stout, clothed below with large ovate-lanceolate pale-brown scals; fronds 6090 cm. long, 30 cm. broad, ovate-deltoid, bipinnate; pinnules of the lowestpinnae 5-7.5 cm. long, 2.5- cm. broad, deltoid-lanceolate, acuminate, out down to a narrow rachis with deeply inciso-pinnatifid ovate-oblong lower segment; texture herbaceous; sori 2-12 to asegment placed at the base of its teeth on upper side of the central veins.

Assam, India, Sikkim, China: Yunnan, Szechwan.

9. Davallia immersa Wall, List n. 256 (182); HK. Sp. 1. 156, (1846);

HKBK. 91; Christ, 302; Matthew 356, (1911).

Leucostegia immersa Presl., 1836.

Rhizomes hypogaeous, wide-creeping, stout, fibrillose; stipes 10-20 cm. long, strong, stout; fronds 30-45 cm. long, 15-23 cm. broad, deltoid, tripinnate; lowest pinnules lanceolate-deltoid, 5-7.5 cm. long, 2.5 cm. broad, with broad segments which are obliquely truncate at the base below, and roundly lobes, with the lobes again crenate above; texture herbaceous; sori large, (2 mm. broad), 1-6 to a segment, oblique.

Malayas, N. India, Java, Celebes, China: Canton, Yunnan.

10. *Davallia pulcherima* Baker, Kew Bull. 53, (1895).

Humata pulcherima Diels, 1899, N.Fl. 210.

Rhizomes short-repent, basal paleae linear-subulate, sorbidbrown; stipes contiguous, elongated, very slender, naked; chestnut brown, 2.5-10 cm. long; fronds oblong-deltoid, small, 5-10 cm. long, 3.7-5 cm. broad towards the base, decomposite, glabrous, green, moderately firm; pinnae lanceolate with the lower side of the base cuneate-truncate, the lower ones not reduced, ultimate segments linear 6 mm. broad, uninerved, erecto-patent; sori oblong, closer to or on costule
~~198~~ (P. 198).
of the ultimate segments below the apex, inducium transversal oblong, broad, glabrous, membranaceous, persistent.

Yunnan, in rock crevices.

Nearly allied to *Davallia Clarkei* from the same locality.

11. *Davallia rigidula* Baker, Kew Bull. 8, (1906); Matthew 356 (1911).

Rhizomes wide-creeping, 6 mm. thick, paleae ovate, imbricate, subacute or obtuse, membraneous, pale brown; stipes slender, remote, 15-23 cm. long, stramineous, lower part sparcely paleaceous. Lamina deltoid, rigid, 30 cm. long, green and glabrous on both surfaces, primary rachis slender, naked; pinnae deltoid, petiolate; the basal ones much larger and much laterally produced on the lower side; ultimate segments linear or spathulate, acute, 2.5-3.7 cm. long; sori solitary or two to each ultimate segments, placed near the apex; inducium orbicular, glabrous, pale green, 2/3 mm. in diameter.

Yunnan, Kweichow.

Differs from Polynesian Davallia hymenophylloides (Bl.). in more rigid fronds, not acuminate basal paleae and medial sori on the ultimate segments.

12. Davallia pseudo-cystopteris Kze. Bot. Zeit. 68, 1850.

Acrophorus pseudo-cystopteris Moore, 1857.
Leucostegia pseudo-cystopteris Bedd., Ferns Brit. Ind. t. 92; Handb. 54. 1892.
Davallia pulchra Don. var. pseudo-cystopteris Clarke. Tr. Linn. Soc. Bot. I. 444. 1880.

Very similar to D. pulchra, but the ultimate segments very acute, and the scales of the rhizome more spreading.

N. India, China: Yunnan, Szechwan.

Perhaps a variety of D. pulchra Don. In general habit much resembling D. clarkei, but blade fresh-green, without scales beneath, and the s~~p~~cales of the rhizome like those of D. pulchra, broad, obtuse.

Davallia clarkei Baker, FKBK. 91, (1874); Christ 302; Matthew 355, (1911).

Acrophorus hookeri Moore, 1857.
Leucostegia clarkei Bedd., 1883.
Humata clarkei Diels, 1899, NPfl. 209.

Rhizomes stout, scales dense, large, lanceolate, ferruginous; stipes 7-22 cm. long, stramineous, slender, slightly scaly near the base; fronds deltoid, 7.5-22 cm. long, 3-4 pinnatifid; pinnae subdistant, stalked, lowest much the largest, lanceolate or deltoid, 2.5-5 cm. broad; pinnules deltoid; ultimate divisions few, spaced, ligulate, acute, ascending, one-veined, 1-3 mm. long; texture membraneous; surfaces bright green; naked. Sori minute, round, placed at back of ultimate lobes; inducium pale, membraneous, broader than deep.

Himalayas, Formosa, China: Szechwan-- summit of Omei Shan; Yunnan, Chekiang.

A rare East Himalayan species, first discovered in Yunnan by Father Delavay, a French missionary.

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Var. faberiana C. Chr. Medd. Göt. Bot. Trädg. I. 73, (1924).

Differs from the Himalayan type by larger size, deltoid lamina to 30 cm. long, and 20 cm. broad at the base, the under side of the rachis clad in broad ovate reddish scales.

Scales of rhizome lanceolate, colour of blade yellow-brown, shape of ultimate segments as in the type. The characteristic scales of the rachis beneath are generally crowded at the base of the pinnae and pinnules. In this character the variety resembles D. perdurans Christ from Yunnan, but in this the lamina is more oblong-ovate, and the pinnules of all orders are much close-ly placed, often nearly imbricate, and the color of

the blade is more vividly green.

14. Davallia pulchra Don, Prod. Fl. Nepal. 11, (1825); Christ 303.

Leucostegia pulchra J. Sm., 1842.
Acrophorus pulchra Moore, 18~~4~~57.
Humata-pulchra Diels, 1899, NPfl. 209.
Davallia chaerophylla Wall., 1828, HKEK. 92.

Rhizomes wide-creeping, clothed with broadobtuse adpressed scales; stipes 7.5-15 cm. long, naked; fronds 23-30 cm. long, 10-20 cm. broad, lanceolate-deltoid, tri- or quadripinnatifid; lowest pinnules 2.5-5 cm. long, 2.5 cm. broad; cut down to a narrowly-winged rachis into deeply pinnatifid segments ultimate lobes narrow and acute in the fertile, rather broader in the barren fronds; texture thinly herbaceous, rather flaccid; sori copious, placed at the base of the teeth of the segments, which they about equal in breadth.

Himalaya, Ceylon, Malaya, China: Yunnan.

Var. delavayi Clarke, Journ. Linn. Soc. XXIV. 410; Christ, Bull. Soc. Fr. 52 Mem. I. 65, (1905).

Leucostegia pulchra var. delavayi Bedd., Handb. Suppl. 13.

Ultimate segments very finely cut, being narrower than the sori and of more rigid texture.

N. India, China: Yunnan.

15. Davallia delavayi Bedd. ex Clarke et Baker in Journ. Soc. Bot. XXIV. 410, (1888); Hand.;Mzt. Symb. Sinic. VI. 29. (1929).

Davallia pulchra D. Don. var. delavayi Clarke et Baker l. c.

Rhizome not seen. Frond dark green, broadly triangular, 30 cm. long, 42 cm. broad 6-pinnate at the base, petiole 30 cm. long, densely clothed at the base with broadly ovate-lanceolate finely acuminate brown paleae to 1.5 cm. long, rather sparcely scaly upward, rachis, when dried, brown, deeply sucate, usually covered throughout the partial rachises of the third order with cucullate suborbicular paleae, which are often glomerate beneath. The pinnae of the I and II orders tri-angular-lanceolate, acute, the primary pinnae about 15 pairs on each side, the lowest basiscopic ones 12-13 cm. broad, all sessile; the pinnae of the III and IV orders broadly ovate in outline, obtuse. Ultimate pinnules equally broad, linear, acute, 1-2 mm. long, 1/4-1/3 mm. broad, patent, contiguous. Sori very dense, borne on the bifurcate ultimate pinnules, broader than deep. Inducium

semiorbicular, 1 mm. broad, pale brown, persistent.

N. India, China: Yunnan.

A quite distinct species, being most finely cut of all species in the genus.

(P. 200).
16. *Davallia athamantica* Christ, Bull. Soc. Fr. 52 Mem. 65, (1905); Matthew 355, (1911).

Rhizomes thick as a goose's quill, creeping, dark-brown, clothed with ovate stout flaccid diaphanous ochraceous scales ½ cm. long; leaves solitary or remote; stipes slender but firm, stramineous, 12 cm. long, glabrous in other part. Fronds 15 cm. long, 12 cm. broad, deltoid, accuminate, quadripinnate; pinnae very shortly petiolate, patent, about 12 on each side under the apex, alternate, close, the lower ones 8 cm. long, 3½ cm. broad, broadly lanceolate, broader at base, acuminate; costa slender, flexuous, scarcely winged; pinnules subdeltoid, 8-10 on each side of the costa, the tertiary pinnules ½ cm. long, cuneato-ovate, cut down to the rachis; lobes linear, acute, often bipartite, uninerved, 2 mm. long, 1/3 mm. broad; sori mostly placed on the upper dilated part on forking of segments, minute scarcely 1 mm. broad, extending beyond the small segments, transversely ovate, inducium subreniform, gray, minute.

Yunnan.

May be a form of or identical with D. pseudocytopteris Kze.

17. *Davallia divaricata* Blume, Enum. 222, (1828); HKBK. 96; Christ 300; NPfl. 214.

Davallia polyantha HK., 1846.
Microlepia polyantha Fee, 50-52.

Rhizomes creeping, stout, clothed with linear ferruginous scales; stipes firm, erect, 15-30 cm. long; frond 60-90 cm. long, tripinnatifid; lower pinnae often 30 cm. long, 15 cm. broad; segments deltoid, cut down to the rachis in the lower part, with linear-oblong, sharply toothed lobes, of coriaceous texture; veins uniform, obscure; sori half-cup-shaped, placed obliquely as regards to the central veins in the tooth at some distance from the edge.

Khasya, Mishmee, N. India, Malaya, Formosa, Java, Hongkong, China: Hainan, Kwantung.

Best distinguished from Davallia solida and Davallia denticulata by the position of its sori.

18. *Davallia solida* (Forst) Swartz, Schrad, Journ. 1800^2. 87, (1801) HKBK. 95; Christ 300; NPfl. 214; Matthew 456, (1911).

Trichomanes solida Forst, 1886, Prod. 86.
Humata solida Desv., 1827.
Davallia ornata Wall., 1828.
Davallia lindleyi Hk., 1846.
Davallia fejeensis HK., 1846; HKBK. 97; NPfl. 214.
Stenolobus solida Presl., 1836.
Odontoloma solida J. Sm., 1875.

Rhizomes stout, densely clothed withadpressed scales; stipes strong, erect, 10-15 cm. long; fronds 30-60 cm. long, 30-38 cm. broad, deltoid, tripinnatifid, apex with a moderately broad undivided centre; segments ovato-rhomboidal, deeply toothed, narrower and sharper in fertile frond; veins uniform, of coriaceous texture; sori nearly or quite marginal; inducium semicylindrical.

Malesia, Polynesia, Queensland, Formosa, China: Kiangsu and its neighbouring provinces;

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Var. sinensis Christ, Bull. Boiss. VII. 18, (1899).

A very thickly-set fern having stipes 10 cm. long or slightly longer; frond 15 cm. long; segments very obtuse, unequally cuneate, very few-lobed; sori as in the type, cunpanular-cylindrical. A smaller and simpler form of the type.

Yunnan: Mentze.

19. Davallia denticulata (Burm.) Mett; Kuhn. Fil. Deck. 27. (1867); Matthew 355 (1911).

Adiantum denticulata Burm., Fl. Ind. 236, 1758.
Davallia elegans Sw., 1801; HKBK. 95; Christ 300; NPfl. 214.
Trichomanes elatum Forst., 1786.
Trichomanes epiphyllum Forst., 1786.

Rhizome stout, creeping, densely clothed with woolly fibers; stipes firm, erect, 10-20 cm. long; frond 30-60 cm. long, 23-30 cm. broad, deltoid, tripinnatifid; main rachis slightly winged towards the apex; pinnules of the lower pinnae 5-7.5 cm. long, 2.5 cm. broad, deltoid-lanceolate, cut down quite to the rachis in the lower parts, with oblong-deltoid segments, which are slightly toothed and obliquely truncate at the base on the lower side, of coriaceous; texture; venation close, prominent, irregular; sori several to a segments, marginal, but the sharp teeth projecting beyond them at the edges; inducium half cup-shaped.

Tropical Australia, Malayan Peninsula, Java, Ceylon, Formosa, Philippines, Hongkong, China: Hainan.

Closely allied to Davallia solida, but regarded as distinct among botanists. The best distinct character seems to be the

presence of numerous intermediate spurious venules between the veins proper, as in various species of Trichomanes.

20. Davallia bullata Wall. List. n. 258, (1828); Hk. Sp. 1. 169 t. 50 B. (1846); HKBK. Christ 301; NPfl. 214; Matthew 355, (1911).

Davallia decora Moore, 1859.
Davallia-calobodon Baker, 1874, HKBK. 470.
Microlepia marginata var. compyloptera Kze., 1836.

Rhizomes creeping, stout, clothed with light brown or whitish fibrillose scales; stipes strong, erect, 7.5-10 cm. long; fronds 20-30 cm. long, 10-20 cm. broad, deltoid, quadripinnatifid; pinnules of the lower pinnae lanceolate, 5-7.5 cm. long, 2.5 cm. broad, with deeply inciso-pinnatifid oblong rhombic segments; texture coriaceous; sori deeply half-cup-shaped, occupying the green part of the tooth in which they are placed, marginal, with a horn on the outside.

Hindustan, Formosa, Japan, Java, Corea, Malayas, China: Chefoo Chekiang- Hongchow, Ningpo.

33. Odotosoria (Presl.) Fee, Gen. Fil. 325, (1850-52).
(Incl. Lindsayopsis Kuhn; Stenoloma Fee;
Davallia sp. HKBK.)

Type; Trichomanes chinense L.

Sori terminal or subterminal, roundish or transversely oblong, on the ultimate segments of compound divided fronds, solitary on the vein tips of uniting the tips of more or less 2-5 veins; inducium of the
(P. 2020).
same shape, attached at the inner side of the sorus, opening outwardly receptacle terminal, punctiform. Fronds compound; ultimate segments more or less narrowly cuneate, the apex more or less truncate to the rhizomes.

Sp. 19, widely distributed in tropica, one known in China.

Odontosoria Chinensis (L.) J. Sm. Bot. Voy. Herald 430, (1857); NPfl. 215; Matthew 374, (1911).

Trichomanes-chinense L., 1753.
Adiantum chinense Burm., 1768.
Davallia falcata Sw.,
Lindsaya chinensis Mett., Kuhn. 1868.
Stenoloma chinensis Bedd., 1883.
Davallia tenuifolia Sw., 1801; HKBK. 102.
Stenoloma tenuifolia Fee, 1850-52.
Microlepia chinensis Mett., 1856.
Lindsaya tenuifolia Mett., 1861; Christ 298 (non Bl. 1828).

Rhizomes stout, creeping, densely fibrillose; stipes strong, erect, polished, naked, dark-brown, 15-30 cm. long; fronds 30-45 cm. long, 1523 cm. broad, ovate, quadripinnatifid; lower pinnae ovate-lanceolate, 10-15 cm. long, 5-7.5 cm. broad; pinnules lanceolate, their segments cut down to the rachis below with toothed cuneate lobes, 2-3 mm. across at the apex; texture subcoriaceous, both surfaces naked, the upper shining; sori terminal, usually solitary, often rather broader than deep.

A common fern in tropical Asia extending from Polynesia, to Japan, Philippines, Hongkong, China: Hainan, Kwantung, Fukien, Anwhei, Hangchow, Hupeh, Kiangsi, Kweichow.

34. Microlepia Presl. Tent. Pterid. 124, (1836).

Type: Polypodium spelunceae L.

Sori indusiate, rotundate or transversely oblong, intramarginal or submarginal; terminal; terminal or axillary on the veins or venules; inducium membranaceous, semiorbicular, attached by the base and sides, half=cup-shaped; the anterior margin free, truncate or rounded; veins simple, forked or pinnate from a central costa; venules direct free, the exterior one or more soriferous. Fronds herbaceous or subcoriaceous, pinnate, bi-pinnate or decompound, the margin sometimes attenuated, deltoid, sub-membranaceous and indistinctly crenated, sinulating, accessory inducium. Rhizome creeping or tufted. (Greek, a small scale, alluding to the inducium).

Species about 33, having their head-quarters in S. E. Asia and Polynesia, only 4 from America and one, Africa; 14 are known from China. Mostly large herbaceous graceful greenhouse ferns.

Fronds very variable in size, texture and cutting.

Sori arranged as in Davallia, but differs in membranaceous indusium being shallowly half cup-shaped, attached on the lateral sides as well as on the base; also differs from its close allies, Humata and Davallia, in stipes being not articulated to the rhizome.

Key to species

1. Frond simply pinnate or at best bipinnatifid.

   2. Pinnae crenate or subentire..........1. M. hookeriana
   2. Pinnae deeply cut into broad rounded denticulate lobes, or

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pinnatifid in the lower part into almost free rhombic-oblong pinnules.

3. Pinnae falcate, lanceolate, usually above 7 cm.
   long, usually cut into broad rounded denticulate lobes, a tall fern...........2. M. marginata

3. Pinnae deltoid-lanceolate, under 3.5 cm. long, usually
   pinnatifid in the lower part down to the costa into
   rhombic lobes; a smaller fern (simpler form).....
   ....3. M. pilosella

1. Frond at least bipinnate in the lower part.

  2. Texture membranaceous or herbaceous.

    3. Plants entirely glabrous............4. M. wilfordii

    3. Plants more or less strigose-hairy.

      4. Induicum hispid....................5. M. speluncae

      4. Inducium naked.

        5. Frond 3-4 pinnate, the basal pinnae shortened...
           ....6. M. hancei

        5. Frond bipinnate or tripinnate, lower pinnae
           not shortened.

          6. Pinnae almost sessile, basal ones not
             deflexed, to 9 cm. long....................
             ....7. M. tenera

          6. Pinnae distinctly petiolate, basal ones
             deflexed, to 20 cm. long.8. M. matthewii

  2. Texture more or less coriaceous.

    3. Plants glabrous, to 40 cm. long, fronds tripinnatifid....
       ....9. M. platyphylla

    3. Plants hairy or strigose, much smaller.

      4. Pinnules crenate or broadly toothed.

        5. Fronds above 30 cm. long, pinnae lanceolate,
           above 15 cm. long............10. M. strigosa

        5. Fronds usually to 25 cm. long, pinnae deltoid-lanceolate, to 3 cm. long...3. M. pilosella

      4. Pinnules more or less deeply pinnatifid.

        5. Stipes naked..................11. M. proxima

        5. Stipes pubescent.............12. M. trapeziformis

4. Pinnules (at least the lower ones) pinnate.

5. Fronds broadly oblong-lanceolate, the lower pinnae to 12 cm. long..........13. M. chrysocarpa

5. Fronds deltoid, lower pinnae above 15-30 cm. long.. ....14. M. hirta

1. Microlepis hookeriana (Wall.) Presl. Epim. 95, (1849); Christ 308; NPfl. 215; Matthew 372, (1911).

Davallia hookeriana Wall., 1828, HK. Sp. I. 172 t. 47 B. 1846; HKBK. 97.
Saccoloma hookeriana Fee, 1851.
Scypholepia hookeriana J. Sm., 1875.

Rhizome creeping, both it and the lower part of the stipes pubescent-fibrillose; stipes stout, erect, 10-15 cm. long; fronds 30-45 cm. long, 15-20 cm. broad, simple pinnate; largest/pinnae 10 cm. long, 1.2 cm. broad, linear-acuminate, truncated and auricled at the base above, slightly undulated below and toothed toward the apex, of subcoriaceous texture; rachis and veins villose; sori in continuous rows along the edge; inducium small, about as broad as long.

Assam, Sylhet and Kamoun, Formosa, Hongkong, China: Hainan, Kwantung.

(P. 204).
2. Microlepia marginata (Houtt.) C. Chr. Ind. 427, (1905); Matthew 372, (1911).

Polypodium marginata Houtt., Pfl. Syst. 13^{1}. 199, 1786.
Polypodium marginale Thunb., Fl. Jap. 377, 1784 (non L. 1753).
Davallia marginalis Bak., 1868, HKBK. 98.
Davallia calvescens Hooker, 1846.
Microlepia marginale Bedd., 1870; Christ 307; NPfl. 215.
Microlepia urophylla Bedd., 1866, non 1883.

Rhizomes strong, creeping, villose; stipe 30-60 cm. long, erect, strong; fronds 45-60 cm. long, 23-30 cm. broad, once pinnate; pinnae 10-20 cm. long, about 2.5 cm. broad, linear, cut down about half way to the rachis or less, into bluntish oblong lobes, the base about parallel wit the stem, that of the lower side obliquely truncate, of subcoriaceous texture; rachis densely villose or under surface also hairy-; sori 2-8 to a lobe, submarginal.

Japan, Himalaya, Ceylon, Formosa, Hongkong, China: Kwantung, Anwhei, Hupeh, Chekiang-Hangchow; Kiangsu- I-shing.

A widely distributed species.

The serration of the pinnae varies greatly, in some forms it only crenate, in others deeply cut, in still some

forms pinnatifid more than half way down into triangular lobes, on which are placed sori along the margin, which is crenate or shallowly cut, sori are placed near or someway down below the sinuses.

3. *Microlepia pilosella* (Hooker) Moore, Ind. 298, (1861); Matthew 372, (1911).

Davallia pilosella Hooker, 2 Cent. t. 96, 1861.
Davallia hirsuta Sw., 1801, HKBK. 98.
Trichomanes hirsutum Thunb., Fl. Jap. 339, 1784 (non L. 1753).

Rhizomes creeping, slender, pubescent; stipes slender, erect, 7.5-10 cm. long, pubescent; fronds 15-23 cm. long, 5 cm. broad, lanceolate bipinnate or bipinnatifid; lower pinnae deltoid-lanceolate, about 2.5 cm. long, cut down to a broadly winged rachis with oblong, rather sharply teethed lobes; texture herbaceous; rachises and both surfaces softly hairy; sori 2-6 to a pinnule, marginal in the teeth.

Tsus-sima, Japan, China: Hupeh, Szechwan, Chefoo, Kiangsi, Hunan Kiangsu, Manchuria, Anwhei.

4. *Microlepia wilfordii* Moore, Ind. 299. (1861); Matthew 373, (1911).

Davallia wilfordii Baker, 1867, HKBK. 98; Christ 305.
Davallia rhomboidea Hooker, 2 Cent, t. 48, 1860 (non Wall. 1828; Kze. 1850.

Rhizomes creeping, stipes 10-15 cm. long, slender, naked, flexuous; fronds 15-23 cm. long, 5-7.5 cm. broad; lanceolate, tripinnatifid, the lower pinnae deltoid, stalked, about 2.5 cm. long, 1.2 cm. broad, cut down to the rachis below with broadly ovate-rhomboidal sharply toothed pinnules, texture thin herbaceous; rachis and both surfaces naked; sori 2-6 to a pinnule, apical in the teeth.

Japan, Korea, China: Manchuria, Shensi, Szechwan, Shantung, Chihli.

5. *Microlepia speluncae* (L.) Moore, Ind. XCIII, (1857); Christ 308; NPfl. 215; Matthew 373, (1911).

Polypodium speluncae L., 1753.
Davallia speluncae Baker, 1867, HKBK. 100 (excl. vars. p. 470).
(P. 205).
Davallia flaccida R. Br., 1810.
Aspidium speluncae Willd., 1810.
Davallia jasmaicensis Hooker, 1846.

Stipes strong, 20-46 cm. long; fronds 1-2 m. long, 30-60 cm. broad deltoid, tri- or quadripinnatifid; lower pinnae 15-30 cm. long, 7.5-10 cm. broad, ovate-lanceolate; pinnules

lanceolate, cut down to the rachis below into oblong deeply teethed lobes, of herbaceous texture; rachis and under surface hairy; veins beneath neither prominent nor rigid; sori 2-20 to a segment, placed one or more together at the base of the lobes.

West Tropical Africa, Hindostan, Ceylon, Polynesian Islands, Queensland, West Indian Islands, southward to Brazil, Formosa, China: Hainan.

Baker has combined 3 or 4 closed allied species under this species.

6. *Microlepia hancei* Prantl. Arb. bot. Gart. Breslau I. 35, (1892); Matthew 372, (1911).

Davallia polypodioides Benth., 1861, Fl. Hongk. 361 (non Don 1825).

Rhizome creeping; fronds 26-36 cm. long, 3-4-pinnate; pinnae distant, the 1-2 lowest pairs smaller than the following, which are often 15-20 cm. long, gradually diminishing to the apex; segments lanceolate, oblong or obovate, the larger ones deeply lobed with obovate obtuse lobes texture flaccid, surfaces more or less pubescent; sori solitary under each sinus of the lobed segments or near the margin on the entire ones; inducium short and broad.

Borneo, Khasia, Hongkong.

7. *Microlepia tenera* Christ, Not. Syst. 53, 1909; Matthew 373, (1911).

Rhizomes short-creeping, thick as a swan's quill; light brown, like base of stipes clothed in very thin ochraceous sparce hairs; stipes solitary, slender, scarcely thick as a swan's quill, stramineous, sulcate like rachis, sparcely pubescent, 22 cm. long. Fronds lanceolate, strongly elongate, base not narrowed, 45 cm. long, 18 cm. broad, bipinnate, tripinnatifid towards the base of the lower pinnae; pinnae almost sessile, 20-25 on each side, the lower and middle ones strongly remote, the lowest ones 7 cm. far apart, patent, 9 cm. long; 3.5 cm. broad, oblong, towards base somewhat narrowly sessile, 15-18 on each side, sub-rhomoidal-ovate, obtuse, subequal (obtusely auriculate, on the upper base, scarcely decurrent on the lower), 18 mm. long, 7 mm. broad, lobed; lobes pectinato-confert, 25 mm. long, obtuse, ovate, about 7 on each side, the base of the lower pinnae incised almost down to the costa of pinnules into almost free lobes, the rest broadly winged at base, entire rarely crenate; veins thin, forked; sori numerous, marginal, solitary in sinuses of the lobes, rarely more in inferior lobes, light brown, 0.33 mm. broad, rounded, terminal on incrassate veinlets; inducium gray persistent, almost rounded; texture very thin, soft, diaphanous, light green, young plants pilosulate.

Yunnan, Kwantung.

8. *Microlepia matthewii* Christ, Not. Syst. I. 54, (1909); Matthew 372, (1911).

Rhizomes creeping with the base of the stipes clothed in reddish-brown hairy tomentum, thick as a goose's quill; stipes subsoli-
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tary, flexuous, 20 cm. long, like reddish-stramineous rachis, shortly and adpressedly pubescent, subterete, thick as a swan's quill. Fronds broad deltoid, 50 cm. long, 35 cm. broad, caudate, bipinnate; pinnae about 22 below the pinnatifid apex, patent; the lower ones deflexed, petiolate, base broadly enlarged with slightly elongate caudate, confert-auricle, 20 cm. long, 5.5 cm. broad; pinnules about 25 on each side, imbricate, the lower ones 3 cm. long, 1.5 cm. broad at base; lobes obtuse, rounded, about 6 on each side, serrate; veins oblique, subhidden; in pinnules pinnate, in lobes forked; sori minute, inconspicuous, placed on the upper part of the upper pinnae, submarginal on the sinuses of lobes, solitary and borne on basal anterior veinlets; inducium small, subrunded; texture herbaceous, upper side glabrous, color light green.

Canton.

9. *Microlepia platyphylla* (Don) J. Sm. Lond. Job. I. 427. (1842); Christ 307; NPfl. 215; Matthew 373, (1911).

Davallia platyphylla Don, 1825, HKBK. 99.
Davallia lonchitidea Wall., 1828.

Rhizomes creeping, stout, scaly; stipes 60-90 cm. long, firm, erect; fronds 1-1.33 m. long, tripinnatifid; lower pinnae 30-45 cm. long, 15-23 cm. broad, lanceolate, with distant linear lanceolate pinnules, which are cut nearly to the rachis below into broad bluntish, toothed, oblong-deltoid lobes; texture subcoriaceous, both surfaces naked; sori 2-12 to a segment, placed one in each teeth a short distant from the edge, about a line across.

Ceylon, India, China: Kweichow, Kwangsi, Yunnan.

10. *Microlepia strigosa* (Thunb.) Pres. Epim. 95, (1849); Christ 308; NPfl. 215.

Trichomanes strigosa Thunb., Fl. Jap. 339, 1784.
Davallia strigosa Swartz., 1849; HKBK. 98 (excl.   ).
Davallia polypodioides Don, 1825.
Dichsonia japonica Sw., 1801.

Rhizomes stout, creeping, pubescent, stipe erect, strong, 15-30 cm. long, both it and rachis pubescent throughout; frond 30-90 cm. long, 15-30 cm. broad, lanceolate, bipinnatifid; lower pinnae 10-20 cm. long, 1.8 cm. broad, down to the rachis with unequal-sided, broadly and rather bluntly toothed, oblong,

rhomboidal pinnule; texture subcoriaceous; veins beneath prominently raised and, like the rachis, more or less hairy; sori 2-12 a pinnule, small, placed at the base of sinuses.

N. India, Ceylon, Japan, Malayan Peninsula, Formosa, Korea, Hongkong, China: Szechwan, Fukien, Hupeh, Kweichow, Yunnan, Hunan.

Var. pilosula (Wall.) Clarke, Tr. Linn. Soc. Bot. I. 449, (1880).

Aspidium pilosulum Wall., List n. 337.

Differs from the type tripinnate fronds, rachis of the pinnae beneath with lax scattered hairs not straight.

N. India, China: Szechwan.

11. Microlepia proxima (Blume) Presl. Epim. 95, (1849).

Davallia proxima Blume, Enum. 238, 1828 (excl. .); Bedd. Fern. Brit. India. 84;
Davallia strigosa pt. LK., HKBK. 99.

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Caudex creeping, tomentose, of the thickness of a man's finger; stipes scaleless, subglabrous, shinning, 15 cm. long; frond tripinnate, lanceolate, or deltoid-lanceolate, subglabrous, sparingly pilose on the veins beneath; 60-90 cm. long, rachis slightly scabrous; pinnae (and pinnules) approximate-lanceolate, subglabrous; sparingly pilose on the veins beneath, 60-90 cm. long, rachis slightly scabrous; pinnae (pinnules approximate lanceolate, caudo-acuminate, alternate; pinnules pinnatifid or at the base pinnate; lobes falcato-dentate; sori a little within the margin; indusium cup-shaped.

Malaysia, India, China: Hainan.

For the first time recorded from China (McClure 1921).

12. Microlepia trapeziforms (Roxb.) Kunn, Chaetopt. 347, (1844); Matthew 373, (1911).

Davallia trapiziforms Roxb., Calc. Journ. 4. 516, 1844.
Davallia rhomboidea Wall., 1828.
Microlespia rhomboidea Presl., 1836.
Microlepia polypodioides Bedd., Ferns S. Ind. t. 15, 1863.
Davallia strigosa Sw. var. rhomboidea Wall. 1850 HKBK. 99.

Near M. strigosa Presl., but rather larger in all parts; rachis downy or hispid beneath; lower pinnules lanceolate-deltoid, cut down nearly to the rachis into oblong, entire or irregularly incisolobate or again pinnatifid; suboblique, very obtuse lobes. Sori rather large, usually solitary on the entire lobes, several on the entire lobes, several on the pinnatifid

ones, near the sinuses, with the margin; inducium half-cup-shaped, naked or hispid.

Tropical Asia, Formosa, China: Yunnan.

13. Microlepia chrysocarpa Ching, Sinensia 1: 3 (1929).

Rhizome wide-creeping; 3-4 mm. thick, densely hirsute, sparcely rooted; stipes uniseriate, scattered, 1.5-2 cm. apart, strong, rigid, densely shaggy hirsute near the base, sparcely hirtellous upward, light lustrous castaneous, sulcate, 32-40 cm. long, as thick or slightly thicker near the base than the rhizome. Frond broadly oblong-lanceolate, not at all abbreviate towards base, 35-42 cm. long, 10-12 cm. broad, gradually acuminate towards apex, tripinnatifid or almost tripinnate towards the base of the lower pinnae. Pinnae shortly petiolate, (petiole 3-4 mm. long), 14-17 on each side below a deeply pinnatifid acuminate apex, the lower ones much remoter than upper ones, (5-6 cm. apart), erect patent, confert above the middle, the lower onces 10-12 cm. long, 4-4.5 cm. broad, oblong lanceolate, slightly narrowed towards base, pinnate; pinnules 14-17 on each side below a short deeply pinnatifid acuminate apex, confert, shortly petiolulate, oblong-lanceolate, strongly unequal at base, 2-2.5 cm. long 7-10 cm. broad, pinnatifid almost down to costa into oblong, rounded, more or less crenate lobes, lobes pectinate, the basal ones on the anterior sides much the largest with their outer margin parallel to the rachis of pinnae, 5-7 mm. long, 3-4 mm. broad, about 7 on each side under an acute serrate apex, veins in the ultimate lobes distinct, free, pinnate, 4-5 jugate, each again once-forked, sori dark brown, dense, submarginal, terminating the veinlets in the ultimate lobes, 5-6 on the basal lobes, fewer on the upper ones, unisorous on the uppermost lobes, inducium brown, persistent, almost rounded. Texture thick, coriaceous, light green, sparcely hairy along costa above, densely hirtellous on the rachis, and upper side of the costa of the pinnae, and much less so beneath.

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Kwangsi.

A dense gregarious fern, in habit resembles M. tenera Christ, differs in much longer and broader petiolate pinnae and pinnules of a thick coriaceous texture, more branched veins and veinlets and more sori to each ultimate segment.

14. Microlepia hirta (Kaulf.) Presl. Tent. 125, (1836); Matthew 372, (1911).

Davallia hirta Kaulf., Enum. 223, 1836; HBK. 100.
Davallia villosa Don, 1825.
Dicksonia kaulfussians Gaud., 1827.

Stipes strong, 3060 cm. long; fronds 1-2 m. long, 30-90 cm. broad, deltoid, tri- or quadripinnatifid; lower pinnae 15-30 cm. long, 7.5-10 cm. broad, ovate-lanceolate; pinnules

lanceolate, cut down to the rachis into oblong broadly-toothed lobes, of coriaceous texture; rachis and especially the under surface pubescent; veins beneath prominently raised; sori 2-20 to asegment, place one or more together at the base of the teeth.

N. India, Hawaii, Ceylon, Malayan, Formosa, Hongkong, China: Kweichow.

35. Dennstaedtia Bernhardi, Schrad. Journ. 1800^2. 124, (1801).

Type: Trichomanes flaccidum Forst.

Sori submarginal, at the apex of veins, more or less globose; inducium inferior, united with the margin of the frond to form a distinctly cup-shaped membraneous involucre to the sorus, opening at the top, not all, or very indistinctly 2-valved; fronds rather large, herbaceous, not membranceous, at least 2-pinnate, superficially resembling Dicksonia but not arborescent; veins free, simple forked, or pinnate; rhizome mostly creeping, often hairy, rarely erect or aborescent; stipes not articulate to the rhizome or caudex (In honor of August Wilhelm Dennatadt, early German botanist).

Sp. about of large or medium size widely distributed in Tropics and also in temperate regions of North hemisphere, 1 recorded in South China.

Dennstaedtia scabra (Wall.) Moore, Ind. 307, (1861); Christ. 312; NPfl. 218; Matthew 356, (1911).

Dicksonia scabra Wall., 1828, HKBK. 54.
Dicksonia deltoidea HK., 1844.
Patania scabra Bedd., 1876.
Dennstaedtia deltoidea Moore, 1853.

Rhizomes wide-creeping, villose; main rachis scabrous, often wavy. Fronds very variable in size, 23-82 cm. long, 15-60 cm. broad, deltoid or lanceolate, bipinnate; lower pinnae 10-15 cm. long, lanceolate; pinnules quite distinct, 2.5-3.7 cm. long, 1.2 cm. broad, the lower ones cut down nearly to the rachis into numerous pinnatifid oblong deltoid segments on both sides; texture herbaceous or subcoriaceous; rachis and under surface more or less hairy; sori 2-6 to the lower segments; involucre cup-shaped, subglobse, [illegible] mm. across.

Himalayas to Ceylon, Malayan Pennisular, Japan, Formosa, Korea, China: Szechwan, Yunnan, Kweichow, S. W. Hunan, Fukien, Kwantung, Hainan.

36. Monachosorum Kunze, Bot. Zeit. 119, (1848).

Type: Aspidium subdigitatum Bl.

Sori oblong, terminal on the veins, without inducium,

never confluent. Spores 3-lobato-tetrahedral; receptacle longish, slightly swollen. Fronds large, finely dissected, naked; veins frees; stipes approximate, not articulate to the rhizome; rhizomes short-creeping, hairy.

Near Davallia and Dennstaedtia in habit, from both of which the genus differs in the absence of inducium.

Species 3, in tropical Asia, 2 from China, the third recently known from Japan, (Monachosorum nipponicum Mak.).

Key to species.

I. Frond tripinnate, primary pinnae over 15 cm. long,
 7 cm. broad, the tertiary pinnae pinnatifid into
 4-5 broad lobes..............1. *M. subdigitata*

II. Frond bipinnate, primary pinnae to 7 cm. long;
 1.5 cm. broad, the secondary pinnae only inciso-
 crenate.......................2. *M. henryi*

1. *Monachorossum subdigitatum* (Bl.) Kuhn, Chaetopt. 345, (1882); Matthew 373, (1911).

Aspidium subdigitatum Bl., Enum. 171, 1828.
Polypodium subdigitatum Bl., Fl. Jav. Fil. 196 t. 93, 1829; HKBK. 340.
Phegopteris subdigitatum Bedd., 1883.
Monachorssum davallioides Kze, 1848.
Polypodium davallioides Mett., 1856.

Stipes tufted, firm, 30 cm. or more long, stramineous, naked or furfuraceous; fronds 60- cm. broad; pinnae to 55 cm. or longer, 7-9 cm. broad at base; pinnules lanceolate, often 5 cm. long, 1.8 cm. broad, with close spreading ovate-lanceolate or rhomboidal stalked segments, with blunt lobes or even again pinnate, obliquely truncate on the lower side; texture pellucido-herbaceous; colour dark-green; veinlets 1 to each ultimate lobe, not reaching the edge, and the copious sori terminal upon them.

N. India, Malayas, Formosa, China: Yunnan, Hunan, Hainan, Kwantung.

2. *Monachosorum henryi* Christ, Bull. Boiss. 6. 869, (1898); Matthew 373, (1911).

Habit of M. subdigitatum Kuhn but smaller pinnae to 27 cm. long and 15 cm. broad, lobes broader, much closer, connected by a broad wing, pinnules toward the apex of the frond and of the pinnae subsessile, ovate, never partite but regularly and confertly incisocrenate; sori more numerous, larger, composed of about 20 sporangia.

Yunnan, Kweichow, Kwangsi, Kwangtung.

A small fern, stipes slender 10-15 cm. long, subglabrous; frond deltoid-lanceolate to 18 cm. long, about 11 cm. broad at base, bipinnate or tripinnatifid, hardly tripinnate at the base; pinnae about 20 on each side, confert, lower ones deflexed, upper ones erect-patent, 5 cm. long, 1-1.5 cm. broad, lanceolate, sessile, the upper ones gradually
(P. 210). -
smaller, pinnate; pinnules confert, about 15 on each side under the short pinnatifid apex, petiolulate, rhomboidal-ovate, 4-9 mm. long, the lower ones deeply pinnatifid to the costa; the upper ones lobulate into 3-4 entire oblong or elliptical segmentson each side.

Two specimens in Lingnan Herbarium, Nos. 12408, 12366, from Lun Fan Shan, Kwangtung, Must belong here.

In general details, this species is not very different from M. subdigitatum, but very distinct for its small size, bipinnate deltoid-lanceolate fronds with its pinnae similar to the pinnules of the other species.

Tribe VI. Pterideae.

Sori roundish, oblong or linear, submarginal, solitary and terminal on the vein tips, often confluent into a submarginal line or more commonly uniting the apex of several veins. Inducium marginal, i. e. consisting of the recurved or reflexed, modified edge of the frond or portions of the edge, opening inwardly. Spores mostly tetrangular. Stipes not articulate to the apex.

Key to genera

1. Inducium bearing and covering the sori. Stipes dark ebeneous polished. Pinnae mostly acroscopically auriculate... ....37. *Adiantum*

1. Indicum not bearing, only covering the sori.
   2. Sori submarginal, roundish, roundish, distant, terminal on the veins, confined to the tops of sinuses, 1 to each sinus. Inducium roundish, small, hardly covering the sorus at full maturity.......................... ....38. *Hypolepis*
   2. Sori submarginal, either roundish or oblong, close, soon running into a submarginal line, uniting the apices of the veins, not confined to the tops of sinuses. Inducium transversally oblong, approximate, contiguous, confluent or linear.
      3. Sori terminal on the veins, free, roundish or oblong, soon confluent into submarginal line.
         4. Fronds dimorphous.
            5. Base of stipes abruptly thickened, bearing more or less 3-6 spongy projections on the outer side...39. *Plagiogyria*
            5. Bases of stipes not thickened, not bearing spongy projections........................ ....40. *Cryptogramma*
         4. Fronds uniform.
            5. Veins tips thickened.
               6. Margin of the frond entirely more or less reflexed......41. *Cheilanthes*
               6. Margin of the frond reflexed only in in the sinus where the sorus borne... ....38. *Hypolepis*

5. Vein tips not or hardly thickened.

6. Fronds divided; leaflets more or less stalked, not adnate to the rachis, more or less articulated at the base...............43. Pellaea

6. Frond simple or deeply dissected; segments adnate or jointed, not stalked not articulate.....44. Doryopteris
§ Doryopteridastrum

3. Sori linear or linear-oblong, the receptacle uniting the tips of veins in an intramarginal line, sometimes running them transversally.

4. Stipes with 1-2 free or joining vascular strands.

5. Fronds compoundly divided; lowest pinnules (secondary pinnae) short, close to the rachis, stipule-like..................
.........................45. Histiopteris

5. Fronds simple or divided; if divided the lowest pinnules not stipule-like.

6. Veins free.

(P. 212.).

7. Fronds finely dissected. Sori and indusia more or less meeting against the midribs of the very small and narrow ultimate segments..
..................46. Onychium

7. Fronds not finely dissected; sori and indusia not meeting the midrib of not very small ultimate segments...
..................47. Pteris

6. Veins anastomosing more or less copiously.

7. Stipes black; frond simple or dissected...........44. Doryopteris
§ Eudoryopteris

7. Stipes not black; frond pinnate .47.
..................47. Pteris

4. Stipes with 3 or more free vascular strands...
.........................48. Pteridium

37. Adiantum (Tour.) L. (Gen. pl. 782, 1737)
Sp. plant, 2. 1094, (1753)

Type: Adiantum capillus-veneris L.

Sori rounded to oblong or linear, marginal on the tips of free forked veins, borne on the underside of the indusium, which is a transversely oblong crescent-shaped or roundish, formed of more or less reflexed altered margin of a lobe of the fond. Root stocks creeping or erect, the stipes tufted, usually black and shinning, naked, not jointed to the root-stock, simply pinnate, to bi-, tri- or even quadri-pinnate, or forked; the pinnules destitute of main rib (costa), or only at their lowermargin, usually inequilateral, dimidiate to cuneate-flabella or trapzoidal, their outer edges variously toothed, lobed or erosed, continued or jointed to their pedicels; the veins free, forked. (Greek "dry" from the fact that when plunged in water, the frond comes out dry).

Sp. about 200 in both hemispheres, chiefly tropical, 29 known in China.

Key to species

1. Sporangia borne on both veins and intervening parenchyma. Fronds pedately bi- or simply pinnate..1. A. diaphanum
1. Sporangia borne on the veins only; fronds variously divided.
2. Frond simply pinnate.
3. Pinnae almost sessile or very shortly petiolate in the lower ones plants rooting at apex.................................2.
4. Pinnae orbicular or suborbicular, base rounded or cordate, usually opposite..........................2. *A. capillusjunonis*
4. Pinnae triangular-dimidiate, base cuneate, usually alternate.
5. Plant vilose, pinnae deeply cut into linear segments..........3. *A. caudatum*
5. Plant glabrous, pinnae only obscurely lobed.............4. *A. edgeworthii*
3. Pinnae dimidiate, about twice as broad as deep about 2 cm. or more broad....................................5. *A. lunulatum*
4. Pinnae not dimidiate, at least as broad as deep, less than 1 cm. broad.
5. Pinnae deltoid.
6. Pinnae 1-2 on each side, almost, equalateral triangular......6. *A. gravesii*
6. Pinnae 4-7 on each side, oblong-deltoid.......................7. *A. gravesii*
5. Pinnae suborbicular.
6. Soriferous apex of the pinnae projecting...................8. *A. arcrocarpon*

6. Soriferous apex of the pinnae deeply notched.
7. Pinnae to 4 mm. across...9. A. nanum
7. Pinnae to 8 mm. broad...10. A. leveillei
2. Frond bi- or tripinnate at least in the lower part.
3. Frond bipinnate; pinnule deeply cut into many broad oblong-linear lobes, each terminated by a reniform sorus.............11. A. capillusveneris
3. Frond tripinnate; pinnate; pinnule entire or only cut into fewer lobes.
4. Pinnules over 1.5 cm. broad and deep, mostly cut into 2-3 broad lobes, sori linear, usually 2-3 to each pinnule............12. A. refractum
5. Ultimate pinnules entire or nearly so.
6. Texture rigidly coriaceous, frond linear-oblong, tripinnate only near the base........13. A. roborowskii
6. Texture thin herbaceous, almost fully tripinnate.
7. Ultimate pinnules suborbicular, sori small, globose....14. A. faberi
7. Ultimate pinnules triangular, sori larger, reniform.
8. Ultimate pinnules 4 mm. long; sori 2 or 3 to each pinnule.................................15. A. michelii
8. Ultimate pinnules 6-12 cm. long; sori usually 1 to each pinnule.....................16. A. erythrocalamys
5. Ultimate pinnules sharply dentate.
6. Rhizome creeping, stipes far apart; frond tripinnate only in the lower part (the lowest two pairs of pinnae bipinnate).......................17. A. davidii
6. Rhizome short-erect, stipes caespitose; fronds more fully tripinnate.
7. Pinnules at the base of the pinnae close cover the principal rachis.
8. Pinnules triangular, ½ cm. broad......................18. A. fimbriatum
8. Pinnules rhombic, 1 cm. broad.........................19. A. subemarginatum
7. Pinnules at the base of the pinnae not appressed on the rachis.
8. Pinnules obtriangular or rather obcordate......20. A. edentulum
8. Pinnules deltoid-oblong, cuneate at base.
9. Sori large, dary-colored, 1 to each pinnule.21. A. monochlamys
9. Sori smaller, lighter-colored, usually 2 to each pinnule.
10. Denticulation irregular, stipes glabrous.22. A. venustum
10. Denticulation irregular; stipes clad with reddish articulate hairs below..........................23. A. bonatianum

2. Frond fully qua/rdripinnate.......24. A. latedeltoideum

2. Frond pedate-dichotomously branched, i. e. with the secondary branches springing from the upper side of the 2 primary ones.
   3. Texture coriaceous; ultimat pinnules rhombic to suborbicular to 15 pairs.....25. A. flabellutatu
   3. Texture thin; ultimate pinnules flabellate, at least twice as broad as deep, more than 15 pairs........ ....26. A. pedatum

1. Adiantum diaphanum Blume, Enum. 215 (1828); Hk. Bk. 117; Christ 135; NPfl. 286; Matsu. and Hayata, Journ. Coll. Sci. Tokyo. XXII. 617 (1906); Matthew 540 (1911).

Adiantum setulosum J. Sm., 1846.
Adiantum affine Hk., 1851.
Adiantum heteromorphum Col., 1890.

Stipes 10-20 cm. long, slender, erect, blackish, polished. Fronds 10-20 cm. long, 2.5 cm. broad, simply pinnate with 1-3 branches at the base, which are sometimes nearly as large as the terminal one; pinnules 1.3 cm. broad, 0.6 cm. deep, the margin rather decurved, the upper nearly parallel with it, crenate like the blunt outer edge; texture thin; rachis naked, surfaces nearly so; sori obversely reniform, numerous, but not contiguous, placed in the sinuses of the upper and outer edge.

Formosa, Ineiterm, Java, Japan, New Caledonia, N. Zealand, N. S. Wales, Polynesia, Philippine, Australia, China: Hainan, Foochow.

2. Adiantum capillus--junonis Ruprecht, Distr. Crypt. Vasc. Ross. 49, (1845); HKBK. 283; Diels in Engl. Jahrb. XXIX. 200, (1900); Matthew 540 (1911).

Adiantum cant/oniense Hance, 1861.

Stipes slender, naked, polished, blackish, 5-7.5 cm. long, Fronds 10-15 cm. long, 1.8 cm. broad, simply pinnate with a terminal pinna, or prolonged and rooting at the tip; pinnae in 3-5 distant opposite, sometimes alternate pairs, 1.2 cm. broad, 0.6-1.3 cm. deep, suborbicular, nearly quite entire or slightly lobed, shortly stalked; texture pellucido-herbaceous; rachis and surfaces naked; sori few, around the outer edge, not contiguous, roundish or transversely oblong.

Formosa: China: Canton, Yunnan, Honan, Kwangsi, Szechwan, Chili - Western Hills.

A distinct species of a restricted distribution, characterized by their fronds being essentially simple pinnate, rachis often elongated and rooting at the apex. Regarded by some botanist as a form of Adiantum capillus-veneris. Linn.

3. Adiantum caudatum Linn. Mant. 308 (1771), HKBK. 115; Christ 134; NPfl. 283; Benth. Flora. Hongk. 0 447 (1861); Matthew 340 (1911).

Adiantum hirsutum Bory, 1804.
Adiantum flagelliferum Wall., 1828.
Adiantum coleatum Bl., 1828.

Stipes 5-11 cm. long, tufted, wiry, spreading, dark chestnut brown tomentose; fronds 13-32 cm. long, simply pinnate, often elongated and rooting at the apex; pinnae 1.2-1.9 cm. long, 0.7 cm. deep, dimidiate nearly sessile, the lower line cut straight and horizontal, the upper rounded; more or less cut, often deeply and repeatedly incised, the point usually bunt, the lower ones slightly stalked; texture coriaceous; the veins prominent; the rachis and both surfaces of the frond villose; sori roundish or transversely oblong on the edge of the lobes.

Himalayas, Ceylon, Java, Madagascar Angola, Cape of Verde Islands, India, Japan, Formosa, Hongkong; China Kwantung Hainan, Hupeh, Szechwan, Chihli, Yunnan, Kwantung.

A. rhizophorum SW. a form with pinnae and rachis nearly quite glabrous.

According to Christensen (cf. Medd. Göteb. Bot. Trädg. I. 92. 1924) all the specimens from China named A. balansae Baker by Christ are formes of A. caudatum; the true A. balansae from Tonkin differs by less incised pinnae and glabrous, narrowly-winged rachis.

4. Adiantum edgeworthii Hk. Sp. Fil. 2. 14 t. 81 B; HKBK. 472; Matthew 340 (1911).

A tufted glabrous fern with short erect caudex; stipes 3-6 cm. long, wiry, purplish-ebeneous, shining glabrous. Fronds 6-9 cm. long, 1.5-2 cm. broad at base linear-oblong, elongated, attenuate and often rooting at the apex and then bare of pinnae, pinnae 9-14 on each side, nearly sessile, alternate the lower ones the largest, horizontal patent or somewhat deflexed, dimidiato-oblong, rather-acute, or rounded, base, superior margin obscurely lobed, rather more so in the sterile pinnae, distinct lobes truncate and bearing the sori one on each lobe, sori oblong elongated, approximate, stipes elongated slender and as well as the rachis ebeneous, glabrous.

N. India, Formosa, China: Kweichow, Szechuan, Hupeh, Canton, Yunnan, Chihli - Tungling.

Differs from A. Caudata by more membraneous texture, glabrous surfaces and much less pinnae, and slender elegant habit.

5. Adiantum lunulatum Burm, (non Houtt.) Fl. Ind. 235, (1768); HKJK. 114 Christ 134 (pt.); N.Fl. 283; Benth., Fl. Hongk. 446, (1861); Matthew 340, (1911).

Adiantum philippense L., Sp. 2, 1094, (1753).
Adiantum arcuatum Sw., 1806.
Pteris lunata Retz., 1781.

Stipes 10-15 cm. or to 30 cm. long, tufted, wiry, naked polished, dark chestnut brown. Fronds 15-30 cm. long, 5-7.5 cm. broad, simply pinnate, often elongated and rooting at the extremity; pinnae 0.7-3.7 broad, 1.3-2.5 cm. deep, subdiminiate, the lower edge nearly in line or oblique with the petiole, the upper edge rounded, and like the bluntly-rounded sides usually more or less lobed, petioles petioles of the lower ones spreading, 0.6-1.3 cm. long; texture papyraceo-herbaceous, the rachis and both surfaces naked; sori in continuous lines along the edge.

Cochin-China, Formosa, India, Himalayas, southward to Polynesian Islands Philippines tropical Africa, Madagascar, and Tropical America, Hongkong, China: Kwantung, Szechwan, Yunnan.

A variable widely-diffused yet easily-recognizable species.

Adiantum tremulum Kunze, Adiantum deflectens Mart. and Adiantum filiforme Garden are mere forms of this species.

Var. subjunonicum Christ, Not. Syst. I. 49. (1909); Matthew 340 (1911).

Differs from type in fronds being sub-dimorphic; the central ones erect, apex terminated by a pinna, pinnae distichous, the outer ones decumbent with a rooting apex, pinnae unilatereal, much smaller.

Habit of A. capillus-junonis.

Kweichow, Yunnan.

Var. limbatum Christ, Bull. Geogr. Bot. Man. XI, 226, (1902); Matthew 340 (1911).

A peculiar form for the pinnae attached to petiole at 1/3 way down the lower edge which is bent in an abruptly manner so as to make the pinna of a reniform shape, the margin entire, provided with a line of non-interrupted sori along the outer edge of the pinnae, and the apex of frond- non-radicante but terminated by a pinna.

Perhaps a distinct species, but until more complete material is available it is better retained as such.

Kweichow, Yunnan, Szechwan.

6. *Adiantum greenii*, Ching, Sinensia 1: 8 (1929).

Rhizome short, profusely fibrous-rooted, paleae blackish, dense, ascending, linear- subulate. Stipes 2-3 cm. long, caespitose-fasciculate, dark ebenaceous, naked, capillaceous and so as the rachis. Fronds 1.5-3.5 cm. long, rarely longer, about 2 cm. broad, simple pinnate; pinnae 3-4, sometimes 2 only, 6-8 mm. apart, petiolate (petioles 1½ mm. long), erect patent, the terminal one with a petiole 5-7 mm. long; articulated at base, leaving a persistent petiole upon falling, broadly short-triangular, rarely oblong-obovate, rotundo-cuneate and entire at base, truncate and very obscurely undulate on the broad truncate apex, 6-9 mm. long, 87-10 mm. broad; veins 4-5, flabellate from the base, each again 3-5 forked, fine, distinct. Sori large, solitary, placed at the apex, indusium transversally oblong-reniform, 4-6 mm. long, 1.5 mm. broad, dark brown, attached to a broad shallow sinus. Texture subcoriaceous, translusent, bluish on both sides.

Kwangsi.

A small tufted fern, closely allied to *A. levillei* Christ Christ and A. gravesii Hance, from the former it differs in smaller dimension, fewer and broader pinnae and 3-5 forked veins; from the latter, in still fewer but much broader pinnae and much larger sori.

Var. *microsorum*, n. var.

Differs from the type in fronds often consisting as many as 5 more rounded pinnae with short, reniform sori.

Kwangsi.

A small tufted fern, closely allied to A. levillei Christ and A. gravesii Hance, from the former it differs in smaller dimension, fewer and broader pinnae and 3-5 forked veins; from the latter, in still fewer but much broader pinnae and much larger sori.

Var. *microsorum*, n. var.

Differs from the type in fronds often consisting as many as 5 more rounded pinnae with short, reniform sori.

Kwangsi.

7. *Adiantum gravesii* Hance, Job. 197, (1875); Hk. Ic. Pl. 1632; Christ Npfl. 284; Matthew 340 (1911).

Adiantum mariesii Baker, 1880.

Caudex erect, clothed with minute subulate dark-red paleae; stipes densely tufted, slender, blackish, naked, 2.5-3.7 cm. long. Fronds lanceolate, simply pinnate, glabrous, 2.5-6.5 cm.

long.or longer, 0.8-1.2 cm. broad, pinnae 4-7 pairs, alternate, petiolate, ascending, deltoid, cuneate, equilateral, apex broad, pinnae 4-7 pairs, alternate, petiolate, ascending, deltoid, cuneate, equilateral, apex broad, emarginated 0.4 cm. broad; veins free, flabellate, sori solitary placed in sinuses of pinnae; indusium broad, glabrous, linear or linear-oblong; petiole 0.3-0.4 cm.
(P. 217).
long, of the same color as stipes.

Tohkin, China: Kwantung, Hupeh - Ichang Gorge.

This little tiny fern resembles A. monochlamys in the segments of frond and A. lunulatum in its dwarf habit.

8. Adiantum acrocarpon Christ, Bull. Geogr. Bot. Mem. 110, fig. (1904); Matthew 339 (1911).

Rhizome very small and short, fibrous-rooted, leaves fasciculato-rosulate, stipes and rachis capillaceous, black, 2-3 cm. long. Fronds 2-5 cm. long, pinnate; pinnae 4 or 5, orbicular, 4 mm. broad, shortly petiolate, the lowest entire; glancous, veins 5, flabellate, simple; sori unisorous to a pinna, 1 mm. broad with protruding apices, indusium brown, reflexed.

Kweichow.

Differs from Adiantum gravesii Hance in sori being not encased in a sinus of the crenation, but projecting out like a wart on the periphery of the pinnae.

9. Adiantum nanum Ching, Sinensia 1: 9 (1929).

Rhizome very short, small, paleae stiff, ascending, dense, subulate, blackish; stipes numerous, fasciculato-rosulate, cappilaceous, but stiff, dark ebenaceous, naked, so as the rachis, 1 cm. or less long. fronds 1-1.5 cm. long, 7 mm. broad, simple pinnate, glabrous deep shining green above, bluish beneath; pinnae 3-5, rarely 6, alternate petiolate (petioles 1-2 mm. long, persistent), spreading patent, orbicular to subtriangular, rounded or shortly cuneate at base, base entire, obscurely undulate on the outer margin, 2-4 mm. long, rarely longer; texture thick, stiff, coriaceous, veins fine free, principal veins 2, radiating from the apex of petiole, erect-ascending, each again 1-2 forked towards outer margin, transluscent. Sori solitary, one to each pinna, small, indusium orbicular, entire dark brown, coriaceous, attached to a more rounded shallow sinus of the crenation, springing from veins and parenchyma, and reaching down as far as the centre of the pinnae.

Kwangsi.

A smallest species of the genus known from China. In habit it resembles A. artrocarpon Christ, from which it differs by still much smaller dimension, fewer non-flabelcate veins and

the sori not prostruding from the margin.

10. Adiantum leveillei Christ, Bull. Geogr. Bot. Man. 246; (1906); Matthew 340 (1911).

Rhizomes short, radicose, leaves caespitoso-fasciculate, stipes numerous, rigid, capillaceous, strictly elastic, ebeneous, 5 cm. long, base rarely clothed with black subulate sparce scales 2 mm. long. Fronds 5 cm. long, 2 cm. broad, simply pinnate, pinnae alternate, 2-5 on each side, remote, peticlulate (petioles 1 mm. long, persistent), pinnas 9 mm. long, 6 mm. broad, very obtuse, round-obovate, base cuneate, entire, margin undulate, vein about 20, flabellate, numerous, conspicuous, the middle ones sometimes forked, sori solitary placed on the apex of emarginate pinnae, subreniform, large, 1-4 mm. broad, 1 deep, brown, strongly impressed; plants glabrous, upper surface light green, the lower remarkably glaucous; texture coriaceous.

Kweichow.

11. Adiantum capillus-veneris Linn. Sp. 2: 1096, (1753); Rkbk. 234; Diels l. c. 202; Npfl. 224; Christ 138. Matthew 340 (1911). (P. 219).

Adiantum levinigli Bak., 1891; NPfl. 224.
Adiantum capillus Sw., 1801.
Adiantum emarginatum Bory, 1810.
Adiantum wattii Bak., 1881.
Adiantum pellucido-capillus Fee.

Rhizomes quite stout, horizontal, densely clothed with hairy brown scales; stipes suberect, rather slender, 10-24 cm. long, polished, blackish, naked. Fronds with a short terminal and numerous erecto-patent lateral branches on each side, the lowest slightly branched segments 1.5-2.5 cm. broad, the base cuneate, the outer edge rounded, deeply lobed from the circumference in the direction of the centre, and the lobes again bluntly crenated, lowest petioles 0.6 cm. long; texture pellucido-herbaceous; rachis and both surfaces naked; sori roundish or obreniform, placed in roundish sinuses of the crenations.

A widely dispersed, slender graceful species in the tropics of both hemispheres.

Formosa, India, Malayan peninsular, Japan, Hongkong; China: Canton, Yunnan, Szechwan, Kweichow, Hupeh, S. [illegible]!

var. obtusum Christ, Bull. Geogr. Bot. Man. XI. 224 (1902).

A plant with small rounded, hardly cuneate and slightly incised pinnules.

Kweichow.

var. trifidum, Willd; Christ in Bull. Geogr. Bot. Man. XI. 224 (1902); Matthew 340 (1911).

Pinnules elongate; large, long cuneate, deeply cut into narrow lobes; sori solitary on the apex of lobes.

Europe, Africa, America, Japan, India, China: Kweichow, Hupeh, Yunnan.

12. Adiantum refractum Christ, Bull. Geogr. Bot. Mans. 224, (1902); Matthew 341, (1911).

Rhizomes short, radicose, clothed in subulate rather rigid brown scales; stipes castaneous-ebenaceous, rigid, angular, glabrous throughout, 2 mm. in diameter, 17 cm. long; rachis ebeneous, strongly flexuous, fronds tripinnate, broadly deltoid, 25 cm. long, 30 cm. or more broad at base, much-branched, alternate pinnae, petiolate, the terminal pinnules decrescent towards apex, the lower ones elongate, deltoid, 15 cm. long, 7 cm. broad, bipinnate, ultimate pinnules all petiolulate, the lower ones very approximate obliquely cuneate, towards the principal rachis, rounded, almost dimidiate (i. e. base cut straight) broadly tri-lobed, 1½ cm. long and broad, lobes 4-5 mm. broad, very obtuse, coarsely crenate (not serrate), sori-fuous lobes near the apex, sori ones rarely two to each lobe, 3 mm. long, straight or slightly curved (not reniform) blackish, indusium thin, linear, substraight, dark castaneous; texture thin, color light green, veins much forked.

Kweichow, Szechwan.

- Closely allied to A. capillus-veneris, but well marked by its very long sori (up to 8 mm. long).

13. Adiantum roborowskii Maxim. Mel. Biol. II. 867, (1883); Matthew 341, (1911).
(P. 219).

Caudex small, short paleae dense subulate, black-castaneous; stipes ebeneous, shining, filiform, furnished above base with few lanceolate-subulate cinnamomum-colored deciduous scales, shorter than lamina; lamina linear-oblong 45 cm. long, base scarcely broader, opaque above, paler-lustreous beneath bipinnate; pinnae 6-11, alternate, with terminal one, shortly petiolate and each composed of 1-6 segments, the lowest pinna bipinnatisect, segments short-petiolated towards base, cuneate-obdeltoid; flabellately many-veined and suboblicalutate along veins, margin mostly entire, convex or straight of apex; the sterile obsolutely crenulate, the fertile 2-4 (generally 3) lobulate; sori rather large, 1-3, attached to the base of sinuses between lobes, subglaucous, rounded, terminating the veins.

West China: Kansu, Szechwan, Yunnan.

14. Adiantum faberi Baker, JoB. XXVI, 225, (1888); NPfl. 284; Matthew 340, (1911).

Rootstock erect; basal paleae dense, spreading, linear-acuminate, nearly black-; stipes wiry, naked, castaneous, 10-15 cm. long. Fronds oblong-lanceolate, tripinnate, 12.5-15 cm. long, 2.7-3.7 cm. broad; firm in texture, green, glabrous, lower pinnae deltoid; final segments suborbicular, distinctly petioled, 0.3-0.7 cm. broad, obscurely crenate on the upper margin in the sterile; veins distinct, free, flabellate; sori 1-2, small, globose, incental on the upperedge of the segments, inducium, orbicular, glabrous, much smaller than in *A. monochlamys*.

Hupeh, Szechwan-Omei Shan.

Intermediate between *A. monochlamys* and *A. aethiopicum* of the group of *A. venutum*.

15. Adiantum michelii Christ, Bull. Geogr. Bot. Mans. 12, (1910).
Matthew 340 (1911).

Rhizome short, in a dense matting, densely clothed with tawny setules; leav/es caespitose close, numerous, stipes, slender, shining castaneous ebenaceous. Fronds bi- or towards base tripinnate, 8 cm. long, 5 cm. broad, oblong-ovate, pinnae alternate, about 5 on each side under apex, petiolate; pinnules petiolulate, cuneate, apex round, obtuse, 4 mm. long, 5 mm. broad, sometimes incised, soris apical, contiguous, 2 or 3 to a pinnule, 2-3 mm. long, scarcely exert, indusium large, veins flabellate, very close, color dark green, o/paque, texture herbaceous.

Kweichow.

16, *Adiantum erythrochlamys* Diels, Engl. Jahrb. 29. 201, (1900);
Fl. Cent. China 201; Matthew 340 (1911).

Adiantum roborowskii Maxim. var. robustum Christ, Bull. Geogr. Bot. XVI. 137.(1906).

Caudex erect; stipes 2-6 cm. long, deep shining purple, clothed at base with lanceolate, subulate-acuminate blackish hairs. Fronds elliptic or oblong, tripinnate; glabrous, of papyraceous texture, 6-26 cm. long, 3-5 cm. wide; ultimate segments petiolate, obtriangular or rather obcordate, entire, 3-18 mm. long and somewhat as broad. Sori 1 rarely 2 to each segment, indusium perfect reniform, reddish, finally turning blackish, 4-5 mm. broad, 1-1½ mm. long.

S. E. Szechuan, Shensi.

A robust form of *A. roborowskii*.

2. 220).

7. *Adiantum davidii* Franch. Fl. David II. 150; Bak. Ann. Bot.
V. 209, (1891); Matthew 340 (1911).

Glabrous fern; rhizome creeping; stipes black shining, 15 cm. or almost 30 cm. long; fronds deltoid-acuminate, about 1/3 as long as stipes; texture firm, glaucous beneath, 7.5-15 cm. long, 6.5-12.5 cm. broad at base, tripinnate, pinnae subsessile, confert, sub-narrowly erecto-patent or curvedly ascending, lanceolate, acuminate, base pinnuliferous; pinnules petiolulate, except the upper and the terminal ones, obovato-flabellate, almost dimidiate, 4-5 mm. long, upper surface glaucescent, the upper part finely and deeply dentato-serrated; long acuminate; sori solitary or rarely in pairs, placed on the ultimate segments, indusia short, very reniform, dark-brown.

Formosa, Yunnan; Mouping, on rocks.

A very elongated species, remargkable for its frond substance being curts corraceous rigid and glabeous beneath; pinnae very approximate almost sessile.

Var. prattii (Baker) C. Chr. Medd. Göteb. Bot. Trädg. I. 94, (1924).

Adiantum prattii Baker, Journ. Linn. Soc. 29; 321. 1892; Matthew 341. 1911.

- Frond deltoid-acuminate, not glaucous, indusia rarely reniform, often up to 3 mm. long, straight, pale-brown as young.

Szechwan, Manchuria.

Var. aristatum (Christ) C. Chr. Medd. Göteb. Bot. Trädg. I. 94, (1924).

Adiantum aristatum Christ, Bot. Gaz. 15; 356. 1919.

Frond deltoid, scarcely acuminate, slightly or not glaucous; pinnules more rounded with a large number of aristate teeth; indusia short, pale brown.

Likely a more of var. prattii.

18. Adiantum fimbriatum Christ, Bull. Soc. Fr. 52. Mem. I. 62. (1905); Matthew 340 (1911).

Rhizome short, slender, radicose. Plant naked, leaves fasciculated. Stipes covered at base with subulate black minute scales, filiform, flexuous, shining castaneous, to 30 cm. long. Frond ovate, 10 cm. long, almost equally broad, acuminate, tripinnate; pinnae petiolate, elongate, acuminate; pinnules of 3rd. order petiolulate, with the base close to the rachis, cuneato-flabellate, almost trigonal, the soriferous ones ½ cm. long and as broad, those of the sterile 1 cm. long, ½ cm. broad, the lateral sides entire, apex subrounded, deeply dentate, linear, numerous, pectinuate; texture very thin, veins parallel-branched numerous; sori 1 rarely 2 at apex, not

exert, transversal ovate, 2 mm. broad; indusium ochraceous, scareous, irregularly incised.

Yunnan.

19. Adiantum submarginatum Christ, Bull. Boiss. II. 3. 511, (1903); Matthew 341, (1911).

A large plant, closely allied to A. aethiopicum L. in habit and disposition of pinnae and pinnules, but differs in ultimat segments being petiolate; petioles 2-3 cm. long, segments 1 cm. broad, 3 mm. long, cuneate-rhomboid with the exterior margin much the broadest, lobes mostly tribus not deeply cut, all soriferous; sori 2 mm. broad, moderately curved, subreniform, texture papyraceous, color subglaucous.

(P. 221.).
w. Hupeh.

Near A. venustum, differs always by one pinnule on each side of a pinna very much close to the principal rachis of the frond. It also approaches the type of A. aethiopicum and, more particularly, A. emarginatum Bory of California.

20. Adiantum edentulum Christ, Bull. Soc. Fr. 52. Mem. I. 63 (1905); Matthew 340, (1911).

A species exactly intermediate between A. erythrochlamys Diels and A. capillus-veneris L. in habit, differs from A. erythrochlamys in much larger pinnules, the sterile ones being not entire but provided with small imperceptible dentules, and by generally 3-5 elongate-reniform sori in the fertile ones, indusium deepbrown, oblong, slightly emarginate; pinnules 3-lobed; the fertile ones smaller, 7-8 mm. long, the sterile 1 cm. or more long.

Yunnan.

21. Adiantum monochlamys Eaton Proc. Amer. Acad. 4. 110, (1858); [illegible]. 125; Christ 140; NPfl. 284; Matthew 340 (1911).

Adiantum veitchii Hance, 1858.
Adiantum vennstum var. monochlamys Luerss, 1900.
Stipes 15-24 cm. long, wiry, erect, glossy, dark chestnut-brown, naked; fronds 15-28 cm. long, 10-15 cm. broad, ovate-deltoid, tripinnate; pinnae rather distant; rigid, erecto-patent; segments 0.6 cm. broad, cuneate at the base, the upper edge rounded, slightly toothed; texture coriaceous; rachis naked; sori single or very rarely two, placed in a decided hollow of the upper edge.

Japan, Korea, N. China.

A little pleasing fern very near A. venustum Don.

22. Adiantum venustum Don, Prod. Fl. Nepal, 17, 1825; HKBK. 125;
Christ 139; BrFl. 284; Matthew 341, (1911).

Stipes 15-25 cm. long, slender, erect, wiry, naked, polished, base clad in dark brown linear subulate paleae which extending more sparcely to a distance upward. Fronds 15-32 cm. long 10-20 cm. broad, deltoid, tri- or quadripinnate; pinnae erect-patent, the lower ones deltoid; segments 0.6 cm. across, cuneate at the base, the upper edge irregularly rounded, sometimes broadly lobed, finely toothed, petiolulate, petiole 2-7 mm. long; texture subcoriaceous; rachis naked; sori 1-3 to a segment, large, roundish, placed in distinct hollows of the upper edge.

Afghanistan, Himalayas, China: Yunnan, Szechwan.

Var. smithianum C. Chr. Medd. Göteb. Bot. Trädg. 1. 93, ///. (1924).

Leaves more broadly deltoid than in the type, the pinnules less cuneate, teeth of the sterile edge broader, triangular-acute, shortly aristate or not, and indusia not reniform but semicircular or~~b~~ oblong with the outer edge straight, the inner rounded.

Szechwan.

May be a distinct species. In general habit, it closely resembles A. aethiopicum of Tropical Africa, being pure green, not blu~~s~~ish as the type frequently is.

23. Adiantum bonatianum Brause, Hedwigia 54, 206-207, t. 4.
K. (1914).

Rhizome not seen; petiole 10-14 cm. long, about 1 mm. across,
(P. 222).
brown, shining, channelled above, terte below, covered in the lower part with shining brown linear acuminate, paleae 2-3 mm. long and also long articulate reddish hairs, glabrous in the other parts. Lamina deltoid or ovoid, base scarcely attenuate, obtusish acuminate at the apex membranaceous, glabrous on both sides, subquadripinnate; primary pinnae petiolate, deltoid or ovoid, patent, the upper ones approximate, the others gradually remoter towards the base, 7-9-jugated, alternate the lower ones with an intervening space 1.5-5.5 cm. apart, 7-8 cm. long, about 5 cm. broud at base. Pinnules anadromous, petiolate, the upper ones approximate, those below gradually remoter, 5-7-jugated; segments provided with capillarly brown petiolules, cuneate lose-dentate; rachis and costa shinning brown, glabrous, channelled above, terete below; veins obselate, extending to the teeth of ultimate segments. Sori single or two to each segment, small; indusium membranaceous, reniform, 0.8-2 mm. long.

Yunnan.

Somewhat resembling Adiantum venustum Don, differs in having irregularly ill-developed thick serration of the segments and by the presence on the lower part of the stipes of reddish articulated hairs.

24. Adiantum latedeltoideum (Christ) C. Chr. Medd. Göteb. Bot.
    Trädg. I. 94, (1924).

Adiantum monochlamys var. latedeltoidea Christ, Nu, Gion. Bot. Ital. n. s. 4: 88. 1897.

A larger fern than A. monochlamys, 4-pinnatifid, stipes 20 cm. long, brown shining; lamina 14 cm. long, 12 cm. broad, glaucescent-green, pinnae and pinnules distant, not confert, the ultimate pinnules broadly cuneate, 6-7 mm. long and broad, a ex dentate with about 15 shortly deltoid teeth, which are shortly aristate. Sori almost always one to each segment, indusium ochraceous, semicircular or slightly oblong, not or slightly sinuate.

Shensi.

Differs from A. davidi as well as var. aristatum by the distant pinnae and pinnules of second order and by being fully quadripinnate.

25. Adiantum flabellulatum Linn. sp. 2. 1095, (1753); HKBK.
    126, Benth., Fl. Hong, 447 (1861); Christ 141; NPfl. 284;
    Matthew 39, (1911).

Adiantum amoenum Wall, 1828.

Stipes erect, strong, polished, blackish, naked. Fronds dichotomously branched and the branches once or twice branched again; central pinnae 10-20 cm. long, 1.4 cm. broad; pinnule about 0.8 cm. broad, 0.6 cm. deep, dimidiate, the lower edge nearly straight, the upper rounded, the outer blunt, both entire or slightly toothed; texture coriaceous, rachis and urfaces naked; sori interrupted in several transversely oblong patches along the upper and outer edge.

Hindostan, Himalayas to Ceylon, Japan, Formosa, Malaya, Hongkong, China: Hainan, Kwantung, Szechuan, Kweichow, Chekiang, Fukien, Yunnan.

26. Adiantum pedatum Linn. sp. 2. 1095, (1753) HKBK. 125;
    Christ 140; 284; Matthew 341, (1911).

Adiantum boreale Presl., 1836.
Adiantum myriosorum Baker, 1898.

Stipes 15-28 cm. long, polished, dark chestnut-brown, glabrous.

(P. 223).
Fronds dichotomous, with the main divisions flabellately branched; central pinnae 15-23 cm. long much the longest, 2.5-3.7 cm. broad; pinnules 1.3-0.9 cm. deep, dimidiate, broadest on the side nearest the rachis, the upper and outer margins lobed, sometimes one-third down, the lowest on short slender stalks; texture pellucido-herbaceous; rachis and surfaces naked; sori roundish or transversely oblong, 0.2-0.4 cm. broad.

America, N. Hindostan, Japan, India Manchuria, China: Hupeh; Kiukiang, Szechuan, Kweichow, Yunnan, Manchuria, Chihli.

A very graceful fern with main forks curved elegantly and has fronds 4-6 branched each springing from the upper side, the central ones are most developed.

Var. myriosorum (Baker) Christ, l. c. III. 510, (1905).

Adiantum myriosorum Baker, Kew Bull. 230, (1898).

Habit of Adiantum pedatum L. differs only in smaller globose sori and reniform persistent indusium.

Yunnan, Hupeh, Manchuria.

Var. glaucinium Christ, Bull; Herb. Boiss. VI. 957, (1898); Matthew 541, (1911).

Differs from the type in narrower pinnules which are acutely triangular and bluish-glaucous below.

Yunnan: Mentze.

Var. protrusum, Christ, Bull. Geogr. Bot. Man. XIII, 1101, (1904).

Pinnules confert, sori strongly prominent, oblong, more like Lindsaya birhii BK.

Kweichow.

38. Hypolepis Bernhardi, Schrad.
Neu. Journ. 12. 34, (1806).

Type: Lonchitis tennifolia Forst.

Sori marginal, placed usually in the sinuses of the frond, small, uniform distinct: indusium of the same shape as sori membraneous, formed of the modified reflexed margin of the lobes of the lobes of the fronds. Fronds ample, of herbaceous texture, mostly quadripinnatifid, sometimes bipinnatifid or tripinnatifid. Rhizomes long and wide spreading (Greek "a seal" and "underneath").

Species about 36 in the tropics of both hemispheres, 1 from China; differing from its nearest relative, Cheilanthes, by equal roundish marginal sori placed in the sinuses of the ultimate divisions of the frond and covered with membraneous modified frond-margin.

Key to species

I. Surfaces naked except a few hairs on the midribs..H. puntata

II. Surfaces sparingly glanduloso-pubescent...........H. tenuifolia

(P. 224)

1. **Hypolepis punctata** (Thunb.) Mett.+ Kuhn. Fil. Afr. 120, (1868).

Polypodium punctatum Thunb., Fl. Japan 337, 1784; HKBK. 312. (non Sw. 1801).
Dryopteris punctata, C. Chr. Ind. 287, (1905); Matthew 366, (1911).
Phegopteris punctata Mett., 1864; Christ 277; Bedd. Handb. 295.
Nephrodium punctatum Diels, 1099, NPfl. 177.
Polypodium amplum Col., 1892.

Rhizome firm, wide-creeping, villose; stipes widely scattered, 30-60 cm. long, firm, erect, stramineous, polished, naked or hairy, and viscid; fronds 30 cm. 1.33 m. long, 15-60 cm. broad; lower pinnae sometimes 30-60 cm. long, 2-3-pinnate, deltoid or oblong-ovate; pinnules and segments close, lanceolate; ultimate lobes oblong, crenate or pinnatifid with the edge often more or less reflexed; texture herbaceous; rachis naked or viscid; under side slightly hairy; sori copious, marginal.

A species widely distributed in the tropics of both hemispheres; Chili, New Zealand, Australia, Philippines, N. India, Ceylon, Hawaii, Japan, Korea, China: Kwantung, Hainan, Fukien, Manchuria, Anhwei, Chekiang, Hunan, Hupeh, Kweichow, Yunnan, Szechwan.

2. **Hypolepis tenuifolia** (Forst) Bernth. Schrad. Neu. Journ. 1^2. 34. (1806); Hk. Sp. 2. 60 t. 89 C. and 90 A. HKBK. 129; Christ 278; NPfl. 278; Matthew 371, (1911).

Lonchitis tenuifolia Forst, Prod. 80, 1786.
Phegopteris tenuifolia Key., 1873.
Adiantum tenuifolia Poir., 1810.
Cheilanthes arborescens Sw., 1806.
Cheilanthes pallida Blume, 1828.
Hypolepis pallida Hooker, 1852.

Rhizomes wide-creeping, puberulous; stipes 30 cm. long, strong, erect, slightly asperous, naked or pubescent; fronds 1.33-

1.66 m. long, tri- or quadripinnatifid; lower pinnae ovate-acuminate, 30-45 cm. long, 12-23 cm. broad; pinnules lanceolate; segments rather distant, 2.5-3.7 cm. long, 1.2 cm. broad, lanceolate, cut down to the rachis into numerous linear oblong toothed ultimate divisions, texture herbaceous; rachis tomentose, the costa and sometimes the surface beneath slightly hairy and glandular; sori 2-6 to an ultimate division, placed at the sinuses of the teeth.

Australia, New zealand, Polynesia, Medisia; Korea, Formosa, China: Chekiang, Yunnan, Szechwan, Kweichow.

39. Plagiogyria (Kunze) Mettenius, Farng. II Plagiogyia (1858), (Conf. Bower, Ann. of Bot. 24, 423, 1910).

Type: Lomaria euphlebia Kze.

Sori inserted on the more or less thickened ends of the forked side-nerves, finally often confluent, usually covered by the evolute margin; inducium lacking; sporangia long-stalked with a complete oblique ring, spores tetrahedral; fronds tufted, simple-pinnate, dimorphous base, the outer side of which has 3-6 spongy protuberances; sterile fronds serrate; femile ones smaller, pinnae mostly entire, (Greek "oblique" and "round", alluding to the oblique ring around the sporangia).

Species about 17, chiefly in the tropics of Asia.

Key to Species

1. Middle pinnae of barren frond decurrent or adnate.
2. Pinnae cuspidate, sharply biserrate....1. P. argutissima
2. Pinnae not cuspidate, simply serrate towards point.
3. Basal pinnae reduced to rudimentary auricles; texture thin papery.
4. Pinnae broadened at base and decurrent, leaving a sharp narrow sinus...........2. P. henryi
4. Pinnae not broadened at base, leaving a broad sinus......................3. P. stenopteron
3. Basal pinnae only more or less reduced to smaller size; texture much thicker and coarser.
4. Base of pinnae long-decurrent on the upper side only conspicuously; bluish-glaucous on the under surface..............4. P. assurgens.
4. Base of pinnae decurrent on both sides by a rather broad wing; green on the under surface.
5. Pinnae oblong-lanceolate, falcate, strongly contracted on inferior side, so that leaving a very broad rounded sinus.....................................5. P. adnata

5. Pinnae linear-lanceolate, not falcate, broadened on both sides at the base, so that leaving a narrow sinus.

6. Fronds elliptic-oblong; stipes below 10 cm. long; basal pinnae strongly deflexed.

7. Fronds long-caudate; pinnae bluntly serrated near the apex (1/3)............6. P. tenuifolia

7. Fronds shortly caudate; pinnae sharply serrate over 2/3 way down, teeth near apex obscurely double..................P. matsumureana

6. Fronds oblong-lanceolate; stipes much longer; sterile serrated near the apex (1/3); lower pinnae horizontal patent or slightly deflexed...7. P. dunii

1. Pinnae of sterile frond not adnate at base.

2. At least the upper pinnae opposite or subopposite; silvery white on the under surface; pinnae sharply serrate throughout...........8. P. glauca

2. All pinnae remotely alternate; green underneath.

3. Pinnae contiguous, sessile, broad and truncate at base...................9. P. pycnophylla

3. Pinnae remote, the lower ones shortly but distinctly petiolate, base cuneate...P. euphlebia

1. Plagiogyria argutissima Christ, Bull. Geogr. Bot. Man. (1910). 141; Matthew 376, (1911).

Stipes thick as a raven's quill, dark sorbid, and like upper part and rachis stramineous, 6 cm. long; the sterile lamina oblong, acuminate, narrowed downward and the lowest one reduced in the mere triangular auricles 5 mm. long, 40 cm. long, 10 cm. broad in the middle, pinnate, divided almost down to the rachis; pinnae pectenato-close, erect-patent, the lower ones abbreviate, deflexed, 35 on each side, 5 cm. long, 1 cm. broad, broadly and equally adnate, cuspidate, finely acute, biserrate, veins conspicuous but very fine; about 20 on each side, mostly forked from the base or the middle. The fertile lamina also reduced towards base into similar auricles, pinnae contracted, remote, linear, the lower ones with slender petiole ½ cm. long, 5½ cm. long, 2 mm. broad, acuminate, the Upper ones sessile; sporangia yellow; texture flaccid, thin herbaceous, light green, both surfaces glabrous.

Kweichow.

2. Plagiogyria henryi Christ in Bull. Boiss. 7: 8 (1899); Diels in Nat. Pfl. Fam. 1. 4. 282; C. Chr. Ind. 496 (1906).

Lomaria decurrens Baker, Kew Bull. (1906) 9.

Caudex erect, naked; stipes tufted, castaneous, base incrassate, sharply trigonous, those of the sterile frond 10-13 cm. long, those of the fertile frond 30-37 cm. long, sterile frond lanceolate, thin membranaceous, simple pinnate, 37-45 cm. long, 6-10 cm. broad at the middle, gradually attenuate towards the base with the lowest 3 pairs reduced to distinct and broadly adnate auricles, the centreal pinnae lanceolate, confert with very narrow sharp sinuses, 3-6 cm. long, 8-12 mm. broad at the base, which is broadly adnate, margin prominently serrate towards the apex and obscurely crenate below; veins lax, distinct, mostly once-forked or simple; fertile frond about 7 cm. broad, pinnae far apart, 4 cm. long, 3-4 mm. broad, reduced towards the base, linear, distinctly stalked and beaked at the apex.

Annam, China: Yunnan, Anwhei, Chekiang.

Distinguished by its long lanceolate frond, gradually attenuate downward with the lower pinnae reduced to distinct auricled and by its stalked fertile pinnae distinctly beaked at the apex.

3. Plagiogyria stenoptera (Hance) Diels, NPfl. 282, (1899); Matthew 376, (1911).

Blechnum stenoptera Hance, JoB. 268, (1883).
Lomaria stenoptera Baker, 1891.
Lomaria concinna Baker, 1885.

Caudex erect destitute of paleae; blades caespitose; stipes tufted, green, nearly naked, those of sterile lamina 10-12.5 cm. long of the fertile 20-22 cm. long, angular throughout, 1 mm. broad; sterile lamina 12.5-20 cm. long, 6-7.5 cm. broad, almost membraneous, subpellucid, green, glabrous, oblong-lanceolate, simple pinnate, segments about 20 on each side about 4-5 cm. long, 6-8 cm. long, 6-8 mm. broad; lanceolate, contiguous, adnate by a dilated base slightly or scarcely erecto-produced on the upper base, abute, minutely denticulate the lowest ones abbreviate, rounded; veins slender, very conspicuous, rather ascending simple or once forked; fertile lamina, 12.5-15 cm. long, pinnae fewer, remote linear, acuminate, 3-3.6 cm. long, 2 mm. broad; inducium submarginal, membraneous, sori at last naked.

Formosa, China: Szechwan, Kweichow.

4. Plagyogyria assurgens Christ, Bull. Soc. bot. Ital. 293, (1901); Bull. Geogr. Bot. Mans. xvi. 139 c. fig. (19   ).

Lomaria deflexa Baker, JoB. 226. 1888.
Spicanta deflexa O. Ktze., 1900.
Blechnum deflexum Diels, 1900.
Blechnum faberi C. Chr., Ind. 153. 1905.

Rhizomes thick, like the base of stipes clad in persistent black scales, the base of stipes dilated, with 5 or 6 conspicuous glands; dark-brown; young stipes sparcely clad in involute setiform black scales, 1/3 cm. long; sterile leaves with stipes (20 cm. long), 70 cm. long, 10 cm. broad, rachis dilated, compressed, alternately
(P. 227).
winged, green above; lamina caerulea-glauceous on the entire under surface; fertile leaves well over-topping the sterile ones, stipes 26 cm. long, strong, terete, sometimes winged, sulcate, rufo-stranineous; fronds 35 cm. long, 6 cm. broad, the lower pinnae strongly remote (5 cm. distant) and much short, the upper ones larger, close, all slightly obcurant on the upper base, assurgent, linear, 6 cm. long, 3 mm. broad; sporangia brown.

Hupeh, Szechwan.

5. Plagiogyria adnata (Bl.) Bedd. Ferns Brit. Ind. t. 51, (1856); NP-fl. 282; Matthew 376, (1911).

Lomaria adnata Blume, Enum. 205, 1828, HKBK. 152.

Caudex short, stout, stipes 15-33 cm. long, firm, erect, naked, dilated at the base; frond ovate-lanceolate, 30-45 cm. long, 10-15 cm. broad; pinnae linear, falcate, the largest 7.5 cm. long, 9 mm. broad, the lowest equal to those next in order, the lower ones narrowed at the base below, 1.2 cm. apart, the apex narrowed very gradually and finally toothed, of subcoriaceous texture; veins conspicuous; fertile fronds similar, but the pinnae more distant and narrowly linear; rachis naked, erect.

India, Philippines, Malaya, Java, Japan, China: Yunnan, Kweichow, Hainan, Kiangsi, Hupeh, Szechwan, Fukien, Anwhei, Kiukiang.

Var. angustata Ros. Fedds Repert. 13, 122, (1914).

Lamina elongato-lanceolata, angustate, 60-70 cm. long, 5-8 cm. broad, pinnae about 40 pairs with narrow sinuses, the upper ones gradually serrated toward apices.

Yunnan.

Var. distans Ros. Fedde Repert. 13, 122, (1914).

Pinnae linear, entire below apex, often suddenly narrowed downward; the upper pinnae broadly jointed t base, the lower and even as far as the middle ones far apart, with their upper side of the base non;adscendent but contracted, sessile.

Yunnan, Hunan.

6, Plagiogyria tenuifolia Copel. Phil. Journ. Sci. Bot. 3. 281, (1908) Matthew 376, (1911).

Lomaria matthewii Christ, 1912.

Stipes of sterile fronds 15 cm. long, those of fertile fronds 25 cm. long, like rachis glabrous, brown-stramineous, acutely triangular; sterile fronds oblong, 16-20 cm. long, 8-9 cm. broad pinnae scarcely adnate to the rachis, the middle ones 4-4.5 cm. long, 8 mm. broad, acute, coarsely obtuse serrated towards the apex, with narrow intervening sinuses, the lower slightly reduced, the lowest ones strongly deflexed, glabrous texture herbaceous; fertile fronds about 10 cm. long, with about 12 pinnae on each side, 20-25 cm. long, the lower ones stipitate, rather soft.

Hongkong, Kiangsi - Kiukiang.

Not specifically different from small forms of P. adnata, only with shorter stipe, narrower and closer pinnae with almost equal base, i. e. not rounded or cuneate on the lower side and with much narrower or sharp sinus.

7. Plagiogyria dunnii Copel. Phil. Journ. Sci. Bot. 3. 281. (1908); Matthew 376, (1911).

Stipes of sterile fronds 20-25 cm. long, glabrous, base provided with a few glands, brown-bialate, and with rachis acutely carinate; fronds 40 cm. long, 10 cm. broad, acuminate pinnatifid almost erect patent, acuminate, serrulate towards apex, glabrous, texture thin, sinuses rather broad, the lower ones more or less diminute, slightly deflexed adnate at the upperbase; fertile fronds 25 cm. long, with adnate sterile base, mostly 35 on each side, 5 cm. long below the middle, gradually decrescent upward.

Kwantung, Fukien - Yungpin.

Closely related to ~~P~~. P. henryi Christ in habit, but differs by lower pinnae somewhat shortened, more numerous, more remote (with a broad rounded sinus between) and much longer and narrower lanceolate pinnae of much thicker texture, and particularly, by adnate linear fertile pinnae.

8. Plagiogyria glauca (Bl.) Mett. Plagiog. 9. n. 3. (1858); Christ 175; NPfl. 282.

Lomaria glauca Bl., Enum. 204; HKBK. 182; HK. Sp. 3. 22; Bedd. Ferns Brit. Ind. t. 90.

Stipes 30 cm. long, naked, erect; fronds ovate, 30-60 cm. long, 15-23 cm. broad; pinnae contiguous, erecto-pa~~tent~~ntent, linear, 7.5-12.5 cm. long, 1.2 cm. or more b~~o~~road, narrowed gradually and sharply toothed towards the point, narrowed on both sides at the base; texture coriaceous veins fine, subparallel, under surface glaucous; fertile fronds similar, but the pinnae distant and narrowly linear, rachis stout, naked.

N. India, Malesia, Luzon, Formosa, China: Szechwan, Yunnan.

9. Plagiogyria pycnophylla (Kze.) Mett. Plagiog. 8. n. 2. (1858); Christ 175; NPfl. 282; Matthew 376, (1911).

Lomaria pycnophylla Kunze, Bot. Zeit. HK. Sp. III. 21. t. 148; 1848; HKBK. 83; Bedd. Ferns Brit. Ind. t. 52.

Caudex stout, erect woody; stipes stout, erect, naked, 15-23 cm. long; fronds ovate-lanceolate, 2/3-1 m. long, 15-23 cm. broad; pinnae very numerous, linear, spreading, 10-15 cm. long, 1.2 cm. broad; contiguous, sessile, narrow oblong-lanceolate, the base very obtuse, and truncate (neither dilated nor contracted), furnished below with one or 2 prominent glando (sometime wanting) the point narrowed very gradualy and finely toothed; texture coriaceous; veins inconspicuous; fertile fronds similar, but the pinnae distant and narrowly linear, rachis strong, erect, naked.

Malacca, Java, Borneo, Philippines, India, China: Yunnan, Kwantung, Kweichow.

10. Plagiogyria christii Copel. Phil. Journ. Sci. Bot. I. Suppl. II. 153. (1906).

Caudex erect, short; stipes confert, 20-30 cm. long, glabrous, castaneous, shinning, 40-60 cm. long, pinnate; sterile fronds with about 13 pairs of almost horizontal pinnae the lower-pinnae very shortly pedicellate, the upper ones adnated, about 13 cm. long, 15-20 mm. broad; acuminate, serrulate, glabrous, herbaceous; veins simple or forked; the fertile fronds with 12-16 pairs of pinnae, remote, the upper ones adnate, linear, 10 cm. long, 2-3 mm. broad; spores confert
(P. 229).
towards apex of veinlets, covered with membranaceous, inflexed margin later the margin retroflexed and sporangia soon confluent all over the while leaves, 0.3-0.4 mm. high; annulus oblique, not interrupted,

Philippines, China: Canton - Lo-fou-shan (Merrill, 1918).

The type was recorded from Philippine Islands.

A specimen (no 10669, collected by Dr. E. D. Merrill in Lo Fou Shan, Canton, and identified as this species, is hardly distinguishable from P. euphlebia. There must be some mistake in identification.

11. Plagiogyria euphlebia (Kze.) Mett. Plagiog. 10. n. 6. (1858); NPfl. 282; Matthew 376, (1911).

Lomaria euphlebia Kunze, Bot. Zeit. 521, (1848); HKBK. 183; Bedd. Ferns Brit. Ind. t. 165.
Lomaria articulata F. Muell, 1866.

Stenochlaena euphlebia J. Sm., 1841.
Acrostichum triquetrum Wall., 1828.

Stipes stout, woody, elongated, 30 cm. or more long, naked, erect, triquetrous below; fronds ovate-lanceolate, 30-60 cm. long, 15-30 cm. broad; pinnae 2.5 cm. or more apart at the base, erecto-patent, linear, 10-15 cm. long, 1.2-1.8 cm. broad, narrowed at the base on both sides, and narrowed very gradually and toothed towards the point; of subcoriaceous texture; veins prominent, fertile frond similar, but the pinnae more distant and narrowly linear; rachis erect, naked.

- Australia, Loochoo, Hindostan, Japan, China: Kiangsi, Fukien, Kweichow, Yunnan, Szechwan.

40. *Cryptogramma* R. Brown, apud Richards, in Franklin,
Narr. of a Journey, 767, (1823).

Type: Cryptogramma acrostichoides R. Br.

Sterile and fertile fronds different from the same root; sori short or oblong or linear, situated upon a towards the apex of the pinnae veins, occupying a greater or less length of those veins, in age concealing the whole back of the pinnules; involucre continuous, formed of the revolute membraneous dolated margins of the pinnules, which almost meet at the back, concealing the fructification, except in the very mature state. Caudex, short, thick, subrepent, sometimes apparently wanting; roots fibrous; stipes stramineous; fronds small, densely turted, subcoriaceous, of two kinds from the same root; outer ones barren, bipinnate, with somewhat ovate or obovate entire or lobed pinnules, which are crenate-serrate or deeply cut and pinnatifid, veins pinnated; the fertile fronds taller than the sterile, bipinnate, with linear or linear-oblong somewhat siliquiform pinnules, pinnatedly veined.

5 species, inhabiting the different parts of the world under a wide range of climate, 3 are know in China.

Differs from Pallaea rather by its dimorphic fronds than anything else.

Key to species.

1. Fronds bipinnate, rarely tripinnatifid..........1. *C. stelleri*

1. Fronds 3-4-pinnatifid.

(P. 230).
2. Ultimate segments 6-10 mm. long, above 2 mm. broad......
....2. *C. crispa*

2. Ultimate segments to 6 mm. long, 2 mm. broad...3. *C. brunoniana*

1. *Cryptogramma stelleri* (Gmel.) Prantl. Engl. Jahrb. 3. 413, (1882); NPfl. 280; Matthew 353, (1911).

Pteris stelleri Gmel., Nov. Comm. Petr. 12. 519 t. 12. f. 1. 1768.
Allosorus stelleri Rupr., 1845.
Pellaea stelleri Baker, 1868; Christ 157.
Pteris gracilis Michx., 1803.
Pellaea gracilis Hooker, 1858, HKBK. 145.

Stipes more or less scattered, slender, 5-7.5 cm. long, naked, straw-colored, or pale-brown polished. Fronds 5-10 cm. long, 2.5-5 cm. broad, ovate, bi- or tripinnatifid; pinnae lanceolate-deltoid, 2.5-5 cm. long, cut down to the rachis; lower pinnules sometimes again slightly divided; ultimate segments of the barren fronds obovate, slightly crenate, of the fertile one linear-oblong, terminal one much larger than the others, of thinly herbaceous an flaccid texture; rachis and both surfaces naked; veins visible; indusium broad, continuous, membraneous.

Canada, Himalaya, Tibet, N. India to Siberia, China; Yunnan, Szechwan.

2. Cryptogramme crispa (L.) R. Br. Hooker, Gen. Fil. t. 115 B, (1832); HKBK. 144, (excl. var.); Bedd. Handb. 98 t. 50; Christ 156; NPfl. 279.

Osmunda crispa L., Sp. 2. 1067, 1753.
Pteris crispa All., 1785;
Pellaea fumariaefolia Phil., 1891.

Stipes tufted, straw-colored, polished, brownish, and slightly scaly towards the base; fronds 5-10 cm. long, 3.7-5 cm. broad, oblong, tri- or quadripinnatifid, ultimate segments of the barren frond obovate-cuneate, deeply pinnatifid, those of the fertile fronds pod-shaped 6-10 mm. long; texture thickly herbaceous, both surfaces naked.

Arctic Europe, India, China: Yunnan, Shensi, Kansu, Szechwan-Omei Shan.

Var. sinensis Christ, Bull. Geogr. Bot. Man. XVI. 135, (1906); Matthew 353, (1911).

Differs from the European type in sterile leaves tripinnate, ultimate segments (tertiary cuttings) linear, very short, 2 m. long, 1 mm. broad, obtuso-decussate, entire; while in type pinnules (secondary cuttings) ovate, profoundly serrate, teeth ovate acutish.

Szechwan, Shensi.

3. Cryptogramma brunoniana Wall, List n. 396, (1828); Hk et Grev. Ic. Fil. t. 158. (1829); Pfl. 280; Matthew 353, (1911).

Gymnogramma brunoniana Presl., 1836.
Cryptogramme crispa var. auctt., HKB. 144.
Allosorus brunoniana J. Sm., 1841.

Habit of Cryptogramma crispa, but differs by the fertile segments being oblong, about 6 mm. long, 2 mm. broad, with the indusium spreading in the matured plant, and a space left free from fruit in the center.

Japan, Formosa, China: Hupeh, N. China.

(P. 231).

41. Cheilanthes Swartz, Syn., Fil. 5. 126, (1806).

Type: Cheilanthes micropteris Sw.

Sori minute, rounded to oblong borne on the thickened ends of free veinlets forming small and roundish, distinct or nearly contiguous marginal fruit-dots, which at first mostly small and distinct, afterwards more or less confluent in a submarginal line; indusium mostly whitish and membraneous, sometimes herbaceous, formed of the reflexed mordifies margin of separate lobes or of whole pinnule. Usually slender low, tufted, terrestial ferns from creeping or ascending scaly root-stocks, mostly with 2-3-pinnate hairy or chaffy fronds, the sterile and fertile nearly alike; veins free, the stipes usually dark-colored, or shining ebeneous, not jointed to the root-stock; (Greek, "lip" and flower," allusion to the position of sori).

Species 103 widely dispersed almost all over the warmer parts of both Hemispheres, 34 are known in China.

Some species of the genus with contineous marginal indusium closely connect this genus with Pellaea, from which it differs in having segments of sterile fronds pubescent, while Pellaea with glabrous segments. No clear-cut boundary line can be drawn between this genus and Doryopteris, if the two general are delimited in the same sense as it is generally accepted. Christensen suggested (cf. Medd. Göteb. Bot. Trädg. I. 87. 1924) the adaptation of the genus Aleuritopteris Fee which, besides the silver ferns allied to Ch. farinosa, also should include the free-veined species of Doryopteris (D. concolor) and the Chinese ferns now referred to Doryopteris and Ch. argentia with its allies.

Key to species.

1. Fronds deltoid, i. e. the lowest pinnae much the largest.
   2. Underside of the frond without white or yellowish powdery coating.
      3. Fronds oblong-deltoid, twice as long as broad.

4. Fronds finely pubescent on the under surface.....
..........................1. C. delavayi
4. Fronds glabrous beneath.....2. C. tenuifolia
3. Fronds decidedly deltoid, as long as broad or
slightly longer, glabrous on both sides.
4. Texture coriaceous, lower surface lutescent.......
..........................3. C. taliensis
m4. Texture thin herbaceous, lower surface green.
5. Frond 6 cm. broad, long-caudate...............
.........................4. C. wilsonii
5. Frond 15 cm. broad, not long-caudate..........
-.........................5. C. hancockii -
2. Underside of the frond coated with white or yellowish
poder.
3. Fronds dimorphous with the sterile ones in low
dense rosette.................6. C. rosulata
3. Fronds homomorphous.
4. Fronds longer than broad, stipes and rachis
paleaceous................7. C. subrufa
4. Fronds as long as broad, stipes and rachis
glabrous.
5. Only the lowest pair of pinnae incised.
6. Fronds 2-4 cm. long and broad, coated
underneath with always pure-white
powder..............8. C. niphobola
6. Fronds 7 cm. or more across, coated
underneath with yellow waxy powder........
......................9. C. argentia
(P. 232).
5. The lower 3-4 pairs of pinnae incised..........
.......................10. C. albofusca
1. Fronds pentagnous, consisting of 5 deeply pinnatifid
segments.......................11. C. grevilleoides
1. Fronds lanceolate to oblong-lanceolate.
2. Underside of the fronds coated with farinose
powder.
3. Fronds dimorphous, the fertile ones much broader,
herbaceous and destitute of power; the fertile
ones coriaceous, with shorter and much-narrower
pinnae......................12. C. dubia.
3. Fronds uniform.
4. Upper surface tomentose.
5. Texture herbaceous, pinnae opposite...........
.......................13. C. rufa
5. Texture coriaceous, pinnae alternate..........
......................14. C. leveillei
4. Uppor surface glabrous.
5. Pinnae numerous, close, opposite, coated
underneath with dense pure white-powder.....
.........................15. C. farinosa
5. Pinnae fewer, lax, alternate, undersurface only
more or less coated with thin farinose.......
.........................16. C. kuhnii

2. Underside of the frond green.
3. Stipes under 4 cm. long.
5. Fronds bipinnate, stipes scaly or tomentose.
6. Stipes covered with lanceolate acuminate scales...........................17. C. fordii
6. Stipes tomentose and fibrillose...18. C. fragilis
5. Frond trilinnatifid, stipes naked at last..19. C. mysurensis
3. Stipes much taller.
4. Fronda hairy either above or beneath.
5. Rachis strongly flexuose; fronds densely pilose on both sides.........20. C. trichophy
5. Rachis not flexuose, much less hairy.
6. Fronds linear-lanceolate, bipinnatifid, upper surface covered with whitish articulate hairs, glandular below..........................21. C. straminea
6. Fronds ovate-lanceolate, tripinnatifid, upper side naked, villose beneath............................22. C. subvillosa
4. Fronds glabrous.
5. Pinnae opposite at least the lower ones.
6. Fronds bipinnate.
7. Fronds to 8 cm. long, undersurface covered with subsessile yellow glands............23. C. krameri
8. Fronds above 15 cm. long, undersurface destitute of glands.
9. Fronds narrowed towards the base, stipes and rachis sparsely chaffy scaly.............................24. C. bockii
9. Fronds not narrowed towards the base, stipes and rachis glabrous.................25. C. belangeri
6. Fronds tripinnatifid or tripinnate.
7. Texture herbaceous, naked beneath..........................26. C. dalhousiae
7. Texture subcoriaceous, glandular beneath......................27. C. bulbosa

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5. Pinnae alternate.
6. Rachis flexuose, texture rather firm............................28. C. patula
6. Rachis not flexuose, texture pellucid membranaceous.......29. C. yunnanensis

1. Cheilanthes delavayi Baker, Ann. Bot. 5. 211. (1891); New Ferns. 31; NPfl. 275; Matthew 352, (1911).

Stipes tufted, hairy, castaneous, 12.5-15 cm. long. Fronds deltoid or oblong-deltoid, tripinnatifid, 15 cm. long, 5-7.5 cm. broad, moderately firm, green on both surfaces, finely pubescent; lower pinnae much the largest, deltoid, petiolate;

pinnules deltoid, 1.2-1.9 cm. broad, cut down nearly to the rachis into contiguous oblong lobes, indusium continuous, rigid, dark-brown, crenate.

Yunnan.

2. Cheilanthes tenuifolia (Burm.) Swartz. Syn. 129, 332, (1806); HKBK. 138; Christ 144; NPfl. 275; Matthew 352, (1911).

Trichomanes tenuifolia Burm., Fl. Ind. 237, 1768.
Adiantum tenuifolium Sw., 1801.
Cheilosoria tenuifolia Trev., 1877.
Acrostichum tenue Retz., 1791.
Nothochlaena semiglabra Kze., 1850.
Cheilanthes semiglabra Free, 1850-52.

Rhizomes rather slender, creeping; stipes not tufted, 10-20 cm. long, wiry, flexuose, naked, dark chestnut-brown, polished, slightly fibrillose towards the base. Fronds 7.5-20 cm. long, 7.5-10 cm. broad, deltoid, tripinnatifid; pinnae in numerous opposite pairs, the lowest 5-10 cm. long, 2.5-5 cm. broad, deltoid; pinnules on the lowest side the largest, the lowest 2.5 cm. long, cut down to the rachis into oblong entire or sinuato-pinnatifid segments; texture subcoriaceous; rachis polished like the stipes, both surfaces green and naked; sori roundish, subcontinuous; indusium narrow, brownish more or less toothed.

Australia, Himalaya, Ceylon, Malaya, Polynesian Islands, New Zealand Formosa, Hongkong, China: Kwantung, Fukien, Kweichow.

3. Cheilanthes taliensis Christ, Bull. Soc. Fr. 52 mem. I. 58, (1905); Matthew 352, (1911).

Cheilanthes henryi Christ, Bull. Geogr. Bot. Mans. 133. 1906; Matthew 352, 1911.
Cheilanthes bonatiana Brause, Hedwigia 54; 207. t. 4. E. ~~DD~~ 1914.

Rhizomes short, radicose; leaves fasciculated, stipes dark castaneous, base clothed with subulate black scales, otherwise are very glabrous; stipes solitary, flexuosus, 18 cm. long, 1 mm. thick; lamina deltoid, acuminate-caudate, 12 cm. long and broad, tripinnate, the lowest much the largest, 6 cm. long; pinnae about 8 under the pinnatifid apex, the lower ones petiolate, remote (2½ cm. apart), deltoid from base, lanceolate-acuminate, pinnules sessile, base broad but narrowly acuminate, the upper ones lanceolate, subacute, the lower ones cut down to the rachis; lobes close, lanceolate, the upper ones ovate, rather obtuse, almost crenate; margin scarious, reflexed; indusium small, numerous, subrounded, 1 mm. broad, pale; sori irregularly protruding, yellowish; texture coriaceous, color obscurely green, the lower surface lutescent.

Yunnan, Szechwan.

Near Ch. albofusca, but without powder and lower part rachis
(P.-234).
unwinged, upper pinnatifid protion of the lamina generally much prolonged sometimes nearly caudate, and the indusium often interrupted so as to form distinct lacerate-dentate free lobes---C. Chr.

4. *Cheilanthes Wilsonii* Christ, Bull. Geogr. Man. 132, (1909); Matthew 353, (1911).

Rhizomes oblique-erect; short, with the base of stipes covered sparsely with black subulate scales 3 mm. long; leaves fasciculated; stipes slender, castaneous, subnitent, naked, 12 cm. long. Lamina broadly deltoid, caudato-acuminate, 10 cm. long, 6 cm. broad, tripinnatifid, pinnae about -7 beneath the apex, sessile, the upper ones erecto-patent, pinnae 2 cm. broad, the lowest ones much enlarged on the lower side, inequally deltoid, 5 cm. long, 3 cm. broad; pinnules sessile, lanceolate, the tertiary segments of the lowest pinnae free, the upper ones adnate and contiguous, rounded, very obtuse, 1 cm. broad, and long, the lower ones again lobed into small obtuse lobes, the apex of lamina long caudate, coarsely lobed, rachis slender, not winged and like costa dark castaneous; veins castaneous, pinnate in lobes; sori marginal, about 4 on each side of the segment; almost contiguous, roundish, rounded, reddish, indusium broadly ovate-oblong, brownish-gray, persistent, entire, texture thinly herbaceous, color obscurely green, plant glabrous.

West China.

5. *Cheilanthes hancockii* Baker, Kew Bull. 54, 1995; Matthew 352, (1911).

Basal paleae linear, firm, castaneous; stipes 10-25 cm. long, elongated, fragile, castaneous, naked, above the base. Fronds deltoid, 12.5-15 cm. long and broad, glabrous, membranaceous, decomposita, green on both surfaces, rachis castaneous, naked, lower pinnae much larger than the above ones, strongly diminished on the lower side, ultimate segments oblong, obtuse, erecto-patent; sori contiguous, indusium membranaceous, glabrous, orbicular or oblong.

Yunnan.

Intermediate between the common tropical Cheilanthes tenuifolia Sw. and the Japanese Cheilanthes brandtii Franch and Sav.

6. *Cheilanthes rosulata* C. Chr. Medd. Göteb. Bot. Trädg. I. 89, Pl. XX. (1924).

Closely resembles *Cheilanthes taliensis* Christ, but

differs in having dimorphic leaves, the sterile ones densely rosulate, less incised than the fertile with broad foliaceous lobes; stipes 1-2 cm. long, lamina 1.5-2 cm. long and broad, snow-white beneath, the fertile ones much longer, stipes to 5 cm. long, fragile; lamina 4-5 cm. long and broad, sparsely farinose beneath, thinly herbaceous, division of lamina similar to Cheilanthes taliensis, inducium narrower, gray, continuous, eroso-dentate, sometimes lobulate.

Characterized by its most delicate and fragile nature by very thin leaves with the sterile ones borne on short stipes forming a low rosette, above which protrude the fertile ones, which resemble those of Cheilanthes taliensis Christ but differs by its fertile leaves of very thin texture and narrow indusia. The fertile leaves often very thinly farinose and pale-green above.

N. Szechwan.

(P. 235).

7. Cheilanthes subrufa Baker, Kew Bull. 5. (1906) Christ, Bull. Geogr. Bot. Man. 131, (1907) Matthew 352, (1911).

Caudex erect; basal paleae linear, dense, concolored; stipes 5-10 cm. long, caespitose, paleaceous throughout; lamina subdeltoid, bipinnate, 12.5-15 cm. long, 7.5-10 cm. broad toward the base, green and glabrous on the ventral side, white waxy on the dorsal side; paleae on the rachis extending upward to the apex pinnae sessile, lanceolate; basal ones larger than the upper ones, those on the lower side much produced; pinnules linear, obtuse, the lower ones crenate; sori contiguous; often fimbriate.

Kweichow, Yunnan - in the moutains to the North Mentze.

8. Cheilanthes niphobola C. Chr. Medd. Göteb. Bot. Trädg. I. 88. Pl. XIX, b-e (1924).

A small species, resembles very much Cheilanthes argentia in configuration and cuttings but much more smaller, with stipes to 10 cm. long, lamina 2-4 cm. long and broad, thickly farinose snow-white underneath, inducium broader, continuous, less white, with entire, green margin; when young pale yellowish white; entire, turning brown with age; the rachis between the first and second pairs of pinnae is sometimes wingless but generally margined on both sides by a very narrow farinose wing.

N. Szechwan: Tatien, Lsu-tsing, Pemba.

9. Cheilanthes argente (Gmel.) Kze. Linn. 23, 242, 1850; HKBK. 142; Christ 149; N.Fl. 277; Matthew 352, (1911); C. Chr. Medd. Göteb. Bot. Trädg. I. 87, (1924).

Pteris argentea Gmel, Nov. Comm. Pter. 12. 519 t. 12. f. 2. 1768.
Allsous argentea Presl., 1836.
Pellaea tamburii Hk., Hdbk. 146, 1858.
Cheilanthes tamburii Moore, 1861.

Rhizome erect or very shortly creeping, with many fasciculated leaves at the apex. Stipes castaneous, glossy, 15-20 cm. long (in smaller plants shorter); lamina deltoid, palmate, or in large forms pinnate, 7 cm. long and broad, in the type densely covered with pale yellow wax beneath (never pure white,); in the variety *obscura* the powder is totally absent, but leaves from the same rhizome may be covered with and without powder. In the larger forms, the large basal pair of pinnae are separated by a wingless rachis up to 1 cm. long from the following pair, which vary somewhat at base, being decurrent to or nearly to the basal pair of pinnae. Inducium continuous, narrow, entire, grayish, apparently intramarginal, bordered by a green distinctly crenate edge.

Siberia, Altai, Kamschatka, Kora, Japan, Khasya, Philippine, Hongkong, China: Kwantung, Yunnan, Kansu, Hupeh, Szechwan, Chekiang, Chihli, Shantung, Manchuria, Honan.

Var. obscura Christ in Nuov. Giorn. Bot. Ital. n. s. 4, 1. 88 (1899); C. Chr. Medd. Göteb. Bot. Trädg. 1. 87, (1924).
Doryopteris argentia var. obscura Christ
Differs from the type by the under side of the leaves without powder.
Shensi, Chihli, Szechwan.

(P. 256).
10. *Cheilanthes albofusca* Baker, Kew Bull. 54, (1895); Matthew 352, (1911).

Cheilanthes mairei Bransel, Hedwigia 54; 202. T. 4. D. 1914.

Basal paleae lanceolate, firm, castaneous; stipes elongated, 2.5-7.5 cm. long, very slender, naked, castaneous. Fronds firm, small., deltoid tripinnatifid, green above, white-waxy below, 5-7.5 cm. long, and as broad, the lower pinnae much larger than the rest, strongly diminished on the lower side, ultimate segments oblong, erecto-patent; 1-2 mm. broad; sori densely crowded, continuous, inducium broad, brown, contineus, glabrous, persistent.

Yunnan, Szechwan, Shensi.

A pretty little silvery fern., intermediate between Cheilanthes farinosa and Cheilanthes argentea --- Baker

The species is larger than *Ch. niphobola* C. Chr.; lamina deltoid or deltoid-oblong, with the lower 3-4 pairs of pinnae incised (in Ch. argentia and Ch. niphobola all pinnae but those

of the lowest pairs are entire), all connected by a broad, often semiovate or lobed wing to the rachis, inducia very broad, often reaching the midrib, continuous but more or less lacerate-dentate, brown --- C. Chr.

11. *Cheilanthes grevilleoides* Christ, Not. Syst. I. 51, (1909); Matthew 352, (1911).

Rhizomes erect, coarse, short, radicose, stipes black shining, 13-17 cm. long clothed at base with dark-brown subulate sparce scales. lamina palmate, 5-angular, 8 cm. long, almost equalateral, incised almost down to 1 cm. broad from the center; segments 5, ovate-acute, base cuneate, the middle ones much the largest, the 8 cm. long, 3 cm. broad, the lower ones smaller, posterior side broadened and deflexed, all cut down to narrow wing 5-mm. broad; lobes-acute, confert, pectinate, 10-12 on each side, lanceolate-linear, about 1 cm. or more long, 2.5 - mm. broad, separated by very acute by very acute sinuses, entire, rarely lobed; costa ebenaceous; veins strongly oblique, very b-confert, parallel, those in lobes flabellato-pinnate, prominent, brown, the lower surface white-farinoseous, the upper surface glabrous, pale green; sori minute, semi-globose, very numerous, contiguous to the margin of segments; inducium bullate, scarious, ochraceo-brown; Texture coriaceous.

Yunnan.

Another very characteristic Chinese silver fern by its palmately pentagonous frond, which is tripartite with a well-developed pinnatifid pinnule at the base of the lateral pinnae and its bright brown veins distinctly appear from among the greyish-white farina on the under side of the leaves.

12. *Cheilanthes dubia* Hope, Journ. Bomb. Nat. Hist. Soc. 12. 528, t. 2, (1899).

Caudex erect, hidden by the numerous stipes; stipes densely tufted, stout, round, about as long as the fronds, when young, thickly covered with linear-lanceolate hairy-pointed scales with dark centres, which diminish in size and become paler in color upwards, and are there are mixed with small, pale brown, chaffy scales and tomentum; when old less densely clothed and then appearing glabrous and almost black between the scales. Fronds lanceolate, sometimes 30 cm. and upwards in length, pinnate; pinnae pinnatifid nearly to the rachis, lower pinnae as long as or longer than those next above and with lower side enlarged; fronds of two sorts, (1)---the broader herbaceous in texture, with pin-
(P. 237).
nae and segments broad, destitute of powder in texture, secondary rachises and costae with a few, narrow, pale-brow scales, but no tomentum, involucres distinctly separate at tips of veins, often not extending to apices of segments, and often without sori, (2) --- the narrow coriaceous in texture, with pinnae and segments shorter and narrow; rachises and costae densely

clothed with pale-brown to nearly white broad and almost long chaffy scales and tomentum, and under surface of lamina completely covered with white powder; involucres broad, confluent, all round the segments, much lacerate and ciliated.

N. India, China: Yunnan.

Closely allied to C. rufa Don, but of much larger size; the general habit, it resembles the appearance of some large plants of *C. albomarginata* Clarke, except that none of its fronds are deltoid.

13. *Cheilanthes rufa* Don, Prod. Fl. Nepal. 16. (1825); Matt. n. 72 HKBK. 141; Christ 149; NPfl. 276.

Stipes tufted, 2.5-5 cm. long, densely clothed with rusty-brown woolly tomentum; fronds 15-23 cm. long, 5-7.5 cm. broad, ovate-lanceolate, bipinnatifid; pinnae opposite, the lower ones with 2.5-5 cm. between them, oblong; pinnules on the lower side the largest, 6-12 mm. long, linear oblong, sinuato-dentate; texture herbaceous; rachis densely tomentose like the stipe; upper surface tomentose, under surface more or less coated with white powder; sori copious, marginal, roundish, small, inducium brown, ciliate.

N. India, China: Kwantung.

14. *Cheilanthes leveillei* Christ, Bull. Geogr. Bot. Man. 149; (1907) Matthew 352, (1911).

Rhizomes short, radicose, black, clothed with rigid subulate dark brown scales ½ cm. long; leaves densely fasciculated; stipes usually 10 to 20 cm. long, rigid, erect, thick as a goose's quill, rachis and costa densely clothed in piliform patent reddish scales; rachis terete, sometime winged. Fronds lanceolate, 10-15 cm. long, 3 cm. broad, bipinnate, pinnae about 10 on each side under the incised apex, the lower ones remote, the upper ones close, falcato-involute, 3 cm. long, 1 cm. broad, incised down to the costa, segments broadly adnate, about 7 on each side, ½ cm. long, ovate, obtuse, close, entire or minutely denticulate. veins hidden, upper surface yellowish-tomentose, the lower side covered by dense whitish wax; sori marginal, minute, brown, contiguous, inducium semi-circular, gray, inconspicuous.

Kweichow.

15. *Cheilanthes farinosa* (Forsk.) Klf. Enum. 212, (1824); HK. et Grev. Ic. Fil. t. 134; HK. Sp. 2. 77; Bot. Mag. t. 4765; Bedd. Ferns S. Ind. t. 191., HKBK. 142; Christ 148; NPfl. 276; Matthew 352, (1911).

Pteris farinosa Forsk, Fl. Aegypt.-Arab. 187, 1775.
Aleuripteris argyrophylla Fee, 1850-52.

Cheilanthes dealbata Don, 1825.
Cheilanthes bullosa Bedd., Ferns S. Ind. t. 192. 1863.
Cheilanthes chrysophylla HK., 1852.
Cheilanthes brandtii Franch. et Sav., 1879.

Stipes densely tufted, 7.5-10 cm. long, wiry, polished, dark chestnut brown, clothed with linearscales when young. Fronds 7.5-30 cm. long, numerous opposite pairs, the lower ones often much the largest, with the lowest pinnules longer than the other (2.5-5 cm. long) and deep-
(P. 258).
ly.sinuate-pinnatifid, most of the others with a broad entire central space; texture subcoriaceous; rachis and midrib naked and polished like the stipes, under surface densely coated with pure white powder; sori small, brown, placed in a conteruous line along the edge.

India, Phillippine, Formosa, Hongkong, China: Chekiang, Shensi, Kansu, Szechwan, Yunnan, Kwantung.

16. *Cheilanthes kuhnii* Milde, Bot. Zeit, 149, (1867); HKBK. 476; Matthew 352, (1911).

Cheilanthes brandtii Franch. et Sav., Enum. Pl. Jap. 2. 212, 620, 1879.

Rhizomes suboblique, the scales broad-ovate; stipes 3.7-6.4 cm. long, naked, castaneous. Fronds 10-15 cm. long, 3.7-4.5 cm. broad, oblong-lanceolate, bipinnatifid; pinnae lax, the central ones ovate-oblong, obtuse, the lowest remote and rather reduced; pinnules oblong, cut down to a narrow wing, those of the lower side not larger than the others; texture herbaceous; rachis and both sides finely glandular, thinly, farinose.

Japan, China: Chihli, Manchuria, Szechwan.

Var. *Caesia* (Christ) C. Chr. Medd. Göt. Bot. Trädg. I. 90, (1924)
Cheilanthes caesia Christ, Bull. Geogr. Bot. Mans. 133. 1906.
Cheilanthes lanceolata C. Chr., Bot. Gaz. 56; 334. 1913.
The under surface coated with dense white or bluish white powder.

Szechwan.

17. *Cheilanthes fordii* Baker, Job. 304, (1879); Matthew 352 (1911).

Adiantopsis fordii C. Chr., Ind. 22. 1905.

Stipes short, wiry, brown, covered with shaggy spreading brown membranaceous lanceolate acuminate scales. Fronds lanceolate, acuminate, 12-25 cm. long, 2-3.7 cm. broad above the middle, narrowed gradually from the middle to the base, firm in texture, green and glabrous on both sides, rachis wiry

purplish-brown, obscurely scaly; pinnae sessile, lanceolate, 2-3 cm. long, 6 mm. or broader broad, cut down to the rachis in the lower part into oblong obtuse lunate lobes, the lower four or five pairs more distant than the upper ones and growing gradually smaller. Sori rounded, distinct, placed all round the margin of the secondary lobes; indusium rounded, pale green, firm in texture, glabrous, persistent.

Allied to the South American Cheilanthes lendigera (Cav.) Sw.

Formosa, Hongkong, China: Kwantung, Fukien, Chekiang, Kweichow, Kwangsi, Anhoi.

Baker's type was placed upon rather a small plant, specimens from S. Kwantung and Yunnan are much taller, one specimen in tsoong's Herbarium (no. Number!) measure to 36 cm. long, pinnae to 3 cm. long, 1.5 cm. broad at base; in all the specimens studied the paleae on the lower part of stipes are not adpressed as Baker has considered but rather shaggy spreading and setaceous-subulate often with deflexed hair-like points.

18. Cheilanthes gracilis Hk. Fil. Exot. t. 26, (1859); HBK. 135; Matthew 352, (1911).

Stipes densely tufted, not more than 2.5-5 cm. long, strong, erect, tomentose and fibrillose. Fronds 15-30 cm. long, 5-10 cm. broad, ovate-lanceolate, bipinnatifid; pinnae numerous, alternate, the lowest 2.5-3 cm. apart, 2.5-5 cm. long, 1.2 cm. broad, oblong-lanceolate, cut down to the rachis below into numerous linear-oblong, blunt sinuato-crenated lobes; texture herbaceous, rachis bright-brown, tomentose, both sides green and naked except the midrib beneath; sori small, roundish or subcontinuous; indusium pale-brown, membranaceous.

Malayan Penninsular, [illegible], China: Yunnan, Szechwan.

19. Cheilanthes mysurensis Wall. List n. 66. (1828); Hk. Sp. 2. 94 t. 100 A. (1852); Mett. n. 24; Christ 144; NPfl. 275; LKBK. 135.

Cheilanthes opposita Kl., 1824.
Cheilanthes chusana Hooker, 1852.
Cheilanthes fragrans Sw., 1806.

Stipes densely tufted, very short, wiry, dark chestnut-brown, polished, fibrillose below when young. Fronds 7.5-15 cm. long, 3.7-7.5 cm. broad, ovate-lanceolate, tripinnatifid; pinnae numerous, the lowest opposite, 1.8-3.7 cm. long, lanceolate-deltoid, cut down to the rachis into numerous linear-oblong incisio-lanceolate pinnatifid pinnules; texture herbaceous when young, subcoriaceous when mature; rachis polished, chestnut-brown, slightly fibrillose, both surfaces naked; sori

small, roundish, distinct or slightly confluent.

Common in tropical Hindostan, also in Ceylon, Formosa, China: Yangtze valley, Kweichow, Szechwan, Chekiang, Fukien, Kwantung, Shensi.

var. *chusana* (Hk.) C. Chr. Medd. Goteb. Bot. Trädg. 1. 91, (1924).

Cheilanthes chusana Hk., Sp. 2. 95 t. 106B; Hand.-Mzt. Symb. Sinic. 6. 37, (1929).
Cheilanthes mysurensis var. giraldii Christ, Not. Syst. 1; 51. 1909.

Pinnae pinnate or else pinnatifid, segments not deeply crenate-incised, but obscurely crenulate or almost entire, lanceolate-acute.

Shensi, Hupeh, Kweichow, Szechwan, Yunnan.

20. *Cheilanthes trichophylla* Bak. Ann. Bot. 5. 211, (1891); New Ferns. 51; FPfl. 176; Matthew 353, (1911).

Cheilanthes undulata Hope et Wright, Gard. Chron. III. 34; 397. 1903.

Stipes tufted, pubescent, brown, 10-12.5 long. Fronds oblong-lanceolate, tripinnate, moderately firm, densely pilose, 30 cm. long, 7.5-10 cm. broad main rachis flexuose; pinnae; deltoid or oblong-deltoid, the longest 5 cm. long, mostly patent or rather deflexed; final segments linear-oblong, 3-4 mm. long; indusium broad, pale, persistent.

Yunnan, Szechwan.

21. *Cheilanthes straminea* Brause, Hedwigia 54, 205, t. 4, H. (1914).

Rhizome short, erect, with dense fibrous-roots, clothed with ferruginous paleae; paleae linear-lanceolate, capillarily acuminate, slightly dilated at base, to 2 cm. long, margin entire; leaves fasciculated; petiole shining stramineous, clothed in similar paleae as on the rhizome, at last glabrescent; 6-10 cm. long. Lamina linear-lanceolate in outline, acuminate slightly narrowed above the base; texture herbaceous, the upper surface covered with whitish articulate hairs; glandular below, 37 cm. long, 5 cm. broad; pinnato-pinnatifid; pinnae 32-36-jugated below the obtusish, pinnatifid apex, alternate, slightly enlarged at the apex, subhorizontal, with intervening spaces
(P. 240).
1-1.3 cm. apart; the upper ones adnate, margin incised, the rest of pinnae sessile, pinnatifid almost down to the costa: segments sessile, conferte, basal wing about 0.5 mm. broad, confluent, about 9-jugated, subquadrangular in outline, apex

obtuse, margin crenate; rachis and costa shining stramineous, channelled and covered with long whitish articulate dense-hairs above, sparsely so and teret on the underside; veins simple or forked, margins not contiguous apex not incrassate. Indusium closely placed to the lateral lobules, the apex of the segments sterile; 1-3-paired in each segment, the largest 0.5-0.9 mm. broad, fimbriated with white articulated hairs 1 mm. long; spore bilateral, crestedly reticulate, yellow, pellucid.

Yunnan - Mohong.

Very distinct from the rest of the species of the genus. Its habit resembles Athyrium or Dryopteris; most distinctly characterized by its straw-yellow stipes and rachis, soft, herbaceous not in the least, rolled pinnae, broad indusium finged with long, articulate fimbriate hairs and bilateral spores.

22. Cheilanthes subvillosa Hk. Sp. 2. 87. t. 93. B. (1852);
Matt. n. 76; HKbk. 157.

Stipes densely tufted, 5-10 cm. long, polished, naked, bright chestnut brown, rather brittle, clothed with lanceolate acuminate scales below; fronds 15-30 cm. long, 5-7.5 cm. broad, ovate-lanceolate; tripinnatifid; pinnae in numerous pairs, the lower ones distant, 3.7 cm. long, more than 2.5 cm. broad, deltoid; pinnules on the lower ~~lo/er~~ side the largest, sometimes 2.5- cm. long, oblong-lanceolate, cut down to the rachis brown, slightly pubescent, upper surface naked, lower villose, especially on the costa; sori copious; indusium green.

Himalayas, Hongkong.

23. Cheilanthes kramori Franch. and Sav. Enum. Pl. Jap. II. 212,
(1879).

Rhizomes? fronds 12.5-15 cm. long, pale green, membranaceous, and like rachis covered with fine subsessile globose sordid saffron yellow glands; petiole 7.5-10 cm. long, teret~~e~~, shining; castaneous, glabrous; lamina lanceolate deltoid, 5-7.5 cm. long, 2.5-3.7 cm. broad at base, the lowest subpinnatifid; sessile, and slightly remoter, patent, 4-6 on each side, opposite, obtuse; the lowest pinnae obliquely deltoid, 1.8 cm. broad at base, pinnatifid all way down to the rachis; lobes lanceolate, obtuse, the basal on the lower side conspicuously larger, unequally sinuate-crenate, the intermediate pinnae scarcely attenuate from base, lanceolate, deeply lobed; lobes ovate, subentire; the uppermost pinnae confluent, subtiliter crenulate; veinlets forked in the lobes, translucent, the fertile lobules inequal; sori linear, scarcely interrupted, subvallate; indusium spurious, thin membranaceous, pale, glabrous margin crenate-sinuate.

Japan, China: Szechwan.

24. Cheilanthes bockii Diels, Engl. Jahrb. 29, 199, (1900);
Fl. Cent. China 199; Matthew 352, (1911).

Stipes 5-7 cm. long, as like shining chestnut-brown costa clothed in spreading dark gray paleae. Lamina elongated, linear-~~c~~/lanceolate, 35-40 cm. long, 5-8 cm. broad, bipinnate, the lower pinnae reduced, pinnules membranous, glabrous, ovate oblong inciso-crenate.

A nearest relative, or perhaps a variety of Cheilanthes
belangeri
(P. 241).
(Bory) C. Chr. but said to be easily distinguished by its
extraordinary narrow slender fronds which is narrowes towards the base, and somewhat crooked and scattered, chaffy scales on stipes and rachis.

Szechwan: S. Nanchuan.

25. Cheilanthes belangeri (Bory) C. Chr. Ind. 172, (1905).

Pteris belangeri A. Bory, Bel. Voy. Bot. 2. 44, 1833.
Cheilanthes varians Hooker, HKBK. 136, 1852; Christ 145;
NFl. 275.

Stipes densely tufted 5-15 cm. long, chestnut-brown, polished but rather slender and brittle, fibrillose below. Fronds 15-25 cm. long, 3.3-5 cm. broad, lanceolate, bipinnate, pinnae in numerous pairs, the lower ones opposite, often 3.3-5 cm. apart, 2.5-3.3 cm. long, 1.9 cm. broad, deltoid, acuminate, cut down to the rachis in the lower part into oblong or linear-oblong entire or slightly toothed lobes; textur herbaceous; rachis like the stipe, both surfaces naked; sori copious, continuous; inducoim narrow, membranous.

Himalayas, Malayas, Luson, South China.

26. Cheilanthes dalhousiae Hooker, Sp. 2. 80 t. 78 B. (1852);
HKBK. 137.

Cheilanthes farinosa var. dalhousiae (Clarke), Tr. Linn. Soc. Bot. I. 456, t. 51. 1880; C. Chr. Ind. 174. 1905.

Stipes densely tufted, 7.5-15 cm. long, wiry, polished, dark chestnut-brown, when clothed with linear scales; frond 15-30 cm. long 7.5-10 cm. broad, ovate-lanceolate or subdeltoid, tripinnatifid; pinnae in 10 or more opposite pairs, the lowest the largest, 5-7.5 cm. long, 2.5-3.07 cm. broad; pinnules on the lower side the largest, sometimes 2.5 cm. long, linear-oblong, blunt, deeply sinuate-pinnatifid; texture herbaceous; rachis and costa naked and glossy like the stipe; both surfaces naked; sori numerous, rounded, small.

N. India, China: Szechwan.

A naked form of Ch. farinosa, from which it differs by pinnae (even when young) without hairs, scales or powder beneath; involucre deeply crenulate, toothed or lacerate on the margin.

27. Cheilanthes bulbosa Kze, Linn. 24. 274, (1851); Mett. n. 79; HKBK. 137; Matthew 352, (1911).

Stipes densely tufted, 10-20 cm. long, dark chestnut-brown, polished, wiry, slightly tomentose below, and clothed with lanceolate scales. Fronds 15-23 cm. long 5-7.5 cm. broad, ovate-lanceolate, tripinnatifid; pinnae in numerous opposite pairs, the lower ones 2.5-3.7 cm. apart, 3.7-2.5 cm. broad, lanceolate or sub-deltoid; pinnules of the lower side the largest, cut down nearly to the rachis into numerous linear-oblong segments; texture subcoriaceous; rachis like the stipe, upper surface naked, lower glandular; sori copious; indusium pale-brown.

India to S. China.

28. Cheilanthes patula Baker JoB. XXVI. 225, (1888); Matthew 352, (1911).

Stipes castaneous, slender, densely tufted, 10-12.5 cm. broad in the middle, moderately firm in texture, green and glabrous on both surfaces; patent, distant, 2.5-3.7 cm. long; final segments oblong, obtuse, 3-4 mm. broad; sori placed all round the free part of the edge of the segments in nearly continuous line, indusium narrow, glabrous.

Yunnan, Hupeh, Kweichow, Szechwan.

Allied to the Himalayan Cheilanthes subvillosa Hook. and Cheilanthes dalhousia Hook.
(P. 242).

29. Cheilanthes yunnanensis Brause, Hedwigia 54. 204, t. 4. F. (1914).

Rhizome short, oblique, paleae pale, subrounded, cordato-rotunded at the base, abruptly capilliform, acuminate, 4-7 mm. long; leaves fascicled, petiolate; petiole strong, brown, shining, teret, 6-13 cm. long, 1-2 mm. thick, clothed in subrounded or linear-lanceolate paleae as on the rhizomes. Lamina oblong in outline, obtusish at the apex, pinnatifidly acuminate, scarcely attenuate above the base, to 22 cm. long, 4-5.5 cm. broad, membraneous, pellucid, upper surface, when young, glandulosee-pilose, finally glabrescent, the underside clothed sparcely with white articulate long hairs; pinnae about 10-paired below the obtusishly pinnatifid apex, subopposite, the upper ones adnate, approximate, pinnatifid or incised, the lower ones sessile or petiolulate, pinnato-pinnatifid, remoter, towards the base of lamina subdiminished, enlarged under the

costa, triangular in outline, 2.8-04.5 cm. long, base 2.5-3 cm. broad, all patent; the secondary pinnae sessile, pinnatifid or incised, connected by narrow wing; lower rachis chestnut-brown, but green upward, channelled and glanduloso-pilose above clothed with white long articulated hairs below; costa and costules green rachis armed with similar hairs, veins pinnate, obsolete, inducium continuous, membraneous, covering almost the whole under surface of the lamina; spore tetrangular-globose, dull yellow.

Yunnan, Szechwan

In general habit very much likes Ch. kuhnii, but green and the midrib of pinnae villous beneath as in Ch. subvillosa HK., to which it perhaps should be referred as a variety. Allied to Ch. patula in the absence of powder and with flexuous rachis. In general habit it also likes Ch. trichophylla, but, totally glabrous --- C. Chr.

Var. *dilatata* Brause, Hedwigia 54, 205, t. 4. G. (1914).

Differs from the type in having alternate primary pinnae, which are elongate and dilated and secondary pinnae being longer and more widely separate.

Yunnan - Ton-tchouan.

This var. has its lower 3-4 pairs of pinnae 2-4 times as long and broad as those in the type and in their being placed alternate and more widely far apart, so that, inspite of the much greater length of the pinnae, the number of its segments not differ but generally just as many as in the type; the secondary pinnae and the other segments are correspondingly greater and more deeply cut than those in the type.

43. Pellaea Link, Fil. Spec. 48. 59, (1831).

Type: Pteris atropurpurea L.

Sori intramarginal, terminal on the free veins, at first distinct, dot-like or decurrent on the veins, but soon confluent laterally, so as to imitate the marginal continuous line of fructification of Pteris; inducium formed of more or less changed reflexed edge of the frond, broad, membraneous, and sometimes very narrow, quite continuous, rarely interrupted. Small ferns with 1-3 pinnate fronds, the fertile ones with narrower pinnules than the sterile, otherwise both are similar. Stipes generally dark-colored, smooth and shining. (Greek "dusky" alluding to color or stipes).

(P. 243).-

Species about 75, mostly inhabitating the warmer parts of the world, 6 recorded in China. They are rock-loving plants, thriving best on exposed limestone rocks; allied to Cheilanthes in habit of growth and geographical distribution,

differing chiefly by the continuous induclum and smooth fronds. From Pteris it differs only by its being in dot like sori masses borne at the ends of free veins inside the margins, and stipes being filiform, clustered, and dark-colored; while the sori in Pteris borne on a continuous vein-like marginal receptacle, which connects the ends of veins, and stipes being stouter, light-colored and usually solitary.

Key to species

1. Texture strongly herbaceous, entire plant glabrous;
   pinnules ovate-oblong...............1. *P. connectens*

1. Texture coriaceous, plants more or less tomentose
   or paleaceous.
  2. Pinnules linear, below 1.2 mm. broad, 1 cm.
     or more long.......................2. *P. smithii*
  2. Pinnules much broader.
    3. Pinnules oblong-cordate or hastate-triangular......
       ....3. *P. hastata*
    3. Pinnules not so.
      4. Frond long-caudate..........4. *P. mairei*
      4. Frond not so.................5. *P. nitidula*

1. *Pellaea connectens* C. Chr. Medd. Goteb. Bot. Tradg. I. 84.
   Pl. xviii d, xix a. (1924).

Rhizome erect; apex covered with reddish linear entire sparce paleae. Stipes very densely fasciculated, numerous, fragile; rachis and costa shining castaneous, whole plant very glabrous, to 10 cm. long, 1 mm. thick. Lamina lanceolate or subdeltoid-oblong, 10-15 cm. long, 3-4 cm. broad, dark-green on both sides, texture strongly herbaceous, bipinnate or sometimes tripinnate, terminated by a small pinna. Pinnae 6-8 pairs, the lowest ones about 2 cm. or more far apart, the upper ones closer, equally distant, petiole fragile, 1 mm. long, subdeltoid-oblong or shortly oblong, 1.5-2 cm. long, 1-1.5 cm. broad, oddly pinnate. Pinnule equal, 3-4 pairs, shortly petiolulate (petiolute mostly green), ovate-oblong, 6 mm. long, 3 mm. broad, the sterile ones undulately crenate, often with slightly unequal base, truncate or subcordate, the terminal one shortly cuneate, apex rounded, the base pinnules sometimes trifoliate; veins distinct, forked, incrassate at apex. Sori apical on the veinlets, induclum formed of reflexed, slightly altered margin of pinnules, pale greenish, glabrous, interrupted by sinuses, margin irregularly crenate, loosely or scarcely covering the sori. Sporangia large, very few in each sorus (2-4, ~~not~~ sometime 1); spores black, globose, farly large, coarsely verrucose.

North szechwan: Ksu-tsing

An uniquely distinct fern of the genus. It shows the characters of Adiantopsis, Pellaea and Cheilanthes.

2. Pellaea smithii C. Chr. Medd. Goteb. Bot. Tradg. I. 84,
Pl. xvii, a. c. (1924).

Rhizome shortly creeping, apice covered with yellowish-brown, linear, entire dense paleae; stipes numerous, tufted, to 10 cm. long (often much shorter), teret, scarcely 1 mm. across., rigid, clothed with similar but more sparce, smaller, soon deciduous paleae, rachis when young, very shortly dense, glanduloso-puberulous, stramineous
(P. 244).
brown. Limina ovate-oblong or deltoid, 4-6 cm. long, 3 cm. broad, coriaceous, glabrous, except the rachis; bipinnate; Lateral pinnae 3 or 4 on each side of the rachis with a similar terminal one, sessile, 1.5-2 cm. long, deltoid or rather broadly ovate, the lowest ones about ~~4~~ 2 cm. far apart, pinnate down to the costa. Pinnules 1 cm. long, the terminal ones longer, 3-5-paired, linear, about 1 cm. or more long, 1-1.2 mm. broad, oblique or curved, approximate, entire, very rarely pinnatifid, base broadly adnate, the uppermost ones decurrent, apex acute the upper middle ones sulcate. Veins hidden costa convex beneath, thick. Sori intramarginal; inducium continuous, extending from the base of pinnule to the apex, gray at first, later turn quite brown, shining, persistent, contiguous, covering the whole under surface of pinnae with glanduloso-ciliated margin. Spores globose, small, minutely verrucose.

North Szechwan: Hsu-tsing.

A very distinct Chinese species of the genus. All leaves are fertile, without a trace of sterile portion.

3. Pellaea hastata (Thunb.) Prantl. Engl. Jahrb. 3. ~~4~~418, (1882); NPfl. 267; Matthew 375, (1911).

Pteris hastat Thunb., Prod. Fl. Cap. 172, 1800 (non Sw. 1801).
Pteris calmomelanos Sw., 1801.
Pellaea calomelanos Link., 1841 HKBK. 152; Christ 161.

Stipes tufted, strong, erect, 10-15 cm. long, naked, dark-brown, polished, slightly fibrillose towards the base; fronds 10-15 cm. long, 7.5-15 cm. broad, subdeltoid, bi- or tripinnate; lower pinnae rigid, spreading or erecto-patent, linear-oblong and simply pinnate or deltoid and bipinnate; ultimate segments on rigid black stalks, the lateral ones 1.2-1.8 cm. each way, varying in shape from cordate-oblong-obtuse to hastate-triangular, about as broad as long, the two sides at the base often unequal; rachis shining, naked, blackish; texture coriaceous; both surfaces naked, glaucous-green; veins not perceptible; sori a broad marginal line soon hidening the narrow membraneous involucre.

Africa, Cape Colony, Borneo, Reunion, Himalayas, China: Yunnan.

4. Pellaea mairei Brause, Hedwigia 54, 301, t. 4. c. (1914).

Rhizomes not seen. Stipes shinning, chestnut brown, channelled and glanduloso-pilose above, teret and glabrous beneath, clothed in ferrugineous linear, very long, acuminate, paleae 2-3 mm. long; 5-10 cm. long, about 0.8 mm. thick. Lamina subtriangular in outline, linear acuminate, scarcely attenuate towards apex, texture coriaceous, glaucous, the upper side, when young, glanduloso-pilose, finally glabrescent, the underside glabrous, 5-10 cm. long 4.5 cm. broad, subpinnate; pinnae 4-8-jugate, subopposite, falcato-patent, the upper ones adnate, decurrent, linear, margin entire or slightly crenate, the middle ones sessile, linear, the lower side or both sides of the base provided with a linear segments; the lowest 1-2 pairs petiolutate, pinnate-pinnatifid; the pinnules in the inferior side at the base of pinnae unequallateral, much enlarged on the lower side of the sessile base, slightly enlargedat the base, linear, the upper segments conjungated by a very narrow wing, the margin of pinnules and segments not revolute, slightly crenate; rachis channelled above, teret below, petiole similarly chestnut-brown, glandulos pilose, above, covered with very narrow paleae below. The costa and costules glanduloso-pilose above and glabrous below; veins inconspicuous, sori linear, inducium continuous with fimbricate margin, ferruginous, covering the entire margin of the segments.
(P. 245).
Yunnan: Tong-tchouan.

Allied to Pellea nitidula Baker from the same locality, but differs by its very long-caudate frond.

Most likely a form of P. nitidula.

5. Pellaea nitidula (Wall.) Baker, HKBK. k49, (1867); Matthew 375, (1911).

Pteris nitidula Wall., 1828.
Allosorus nitidula Presl., 1836.
Cheilanthes nitidula Hooker, 1852.
Pellaea henryi Christ, Bull. Boiss. 7. 1899; Matthew 375. 1911.

Stipes densely tufted, slender, dark chestnut-brown, polished, 7.5-15 cm. long, fibrillose below; fronds 7.5-10 cm. long, 2.5-3.7 cm. broad, bipinnatifid; pinnae opposite, the lower ones deltoid, cut down to the rachis into a few pinnules; the upper ones linear-oblong, entire, the lower ones again pinnatifid, rachis and both surfaces naked, of coriaceous texture, the veins free not perceptible; sori copious, confluent; inducium broad, membraneous, toothed.

Himalaya, Tibet, Yunnan, Hupeh, Fukien, Kweichow.

44. Doryopteris J. Smith, Journ. Bot. 3. 404, (1841); 4. 162, (1841).

Sori roundish or oblong, either solitary and terminal on the veins but soon running into a submarginal line, or linear and placed on a submarginal receptacle uniting the vein tips. Inducium linear, continuous, consisting of the reflexed modifies margin of the frond. Fronds simple, cordate-hastate, palmate or divided, if divided the segments adnate or jointed, not articulate at the base, veins free or anastomosing, the tips not or hardly thickened. Rhizomes short, the scales costate; stipes black or dark-colored, polished, not articulate to the rhizome, with a single, 2-4-archous vascular strand.

Sp. about 44 in warmer parts of the world with their head quarters in South Africa and tropical America, the following are recorded in China.

Key to species.

1. Veins free; fronds uniform.
2. Frond tripinnatifid, the basal pinnule deeply pinnatifid on both sides into 5-6 oblong lobes, the basal segments shorter.................1. D. concolor
2. Fronds bipinnate, the basal pinnae only sparsely cut on the underside, into 2-3 lobes, the basal one much longer the upper margin entire, or at most obsoletely pinnatifid.
3. Stipes and rachis scaly........2. D. squamosa
3. Stipes and rachis glabrous.
4. Fronds15 cm. across, pinnate with lower 1-3 pairs of pinnae free from one another, densely pale-yellow farinosed below....3. D. veitchii
4. Fronds 8 cm. across, palmatifid with pinnae connected at base usually without powder below........................4. D. duclouxii
1. Veins anastomosing; fronds dimorphic; sterile fronds palmately lobed, fertile ones bipinnatisect.......... ....5. D. pedata

(P. 246).

1. Doryopteris concolor (Langsd. et Fisch.) Kuhn, v. Deck. Reis 33. Bot. (1879); NPfl. 269; Matthew 359, (1911).

Pteris concolor Langsd. et Fisch., Ic. Fil. 19 t. 21, 1810.
Pteris geraniaefolia Fee, 1850-52.
Pellaea concolor Bak., 1870; Christ 157.
Pteris geraniifolia Raddi, 1819.

Stipes 15-23 cm. long, naked, erect, wiry, brownish-black, polished slightly scaly towards the base. Fronds 5-10 cm. each way, deltoid, cut down nearly to the rachis into 3 or 4 pinnae on each side, of which the lowest pair is much the largest, with the pinnules on the lower side much large than the others and deeply lobed with linear-oblong segment; rachis of herbaceous texture and costa dark colored, and polished like the stipe, lateral veins once forked, clearly visible; sori in broad marginal lines.

Tropical America, Brazil and Peru to Australia, Angola and Cape Colony, Japan, Korea, China: Hupeh - Wushang Gorge and Yangtze Valley.

2. Doryopteris squamosa C. Chr. Ind. 245 (1905).

Cheilanthes hopeana C. Chr., Ind. Suppl. 18, 1913.
Pellaea squamosa Hope et Wright, Journ. Linn. Soc. XXXV. 518, 1903.

Stipes tufted, clothed with lanceolate deciduous paleae, castaneos 2.5-15 cm. long. Fronds (and basal fronds) deltoid, bipinnatifid, glabrous above (except the costa which is sparcely scaly), clothed on the under surface with dense lanceolate-acuminate stramineous paleas; the upper fronds deltoid, bi- or (in lower part) tripartite, lobes oblong, obtuse, glabrous above, whitish-farinose beneath and scaly near costa; sori linear, entire, multisporangiate, spores globose, 45-55 m. in diameter.

Yunnan.

Closely allied to D. veitchii, but well distinguished by its squamose stipes and rachis, which is winged throughout. It is better to refer it to Cheilanthes --- Christensen.

3. Doryopteris veitchii Christ, Bull. Geogr. Bot. Man. 134, (1906).

Doryopteris michelii Christ, Bull. Geogr. Bot. Mans. 10. 1910; Matthew 559. 1911.

Rhizomes short, thick, radicose, sparcely clad in black subulate 1/3 cm. long scales, leaves fasciculated; stipes teret, rigid, polished-ebenaceous, 18 cm. long, clad in similar scales near the base, glabrous in other parts; lamina broadly deltoid, 15 cm. long, base, broad and broadly tripinnatifid, base tripinnatifid, base tripartite, the lowest pinnae much the largest, deltoid, strongly enlarged at base on the upper side, about 5 on each side, decurrently pinnatifid towards apeces, interstices 3, 2½ cm. apart, the lowest pinnae bipinnatifid down to rachis, pinnules, about 7 on each side, remote, linear, adnately decurrent, obtuse, lobed, lobes 6-7 on each side, obtuse-ovato-lanceolate, 3 mm. broad, margin entire, the upper pinnae similar but diminiately lobed, rachis and costa ebeneous, texture coriaceous, the upper surface obscurely green; the lower surface waxy white, veins hidden; sori continuous marginal, ½ mm. broad, flavo-brown, induciun slender, brown coriaceous.

Kweichow, Yunnan, Szechwan.

Larger than D. duclouxii, with 1-4 pairs of free, often distant pinnae upper pinnules of basal pinnae in the typical

forms free, distant and lobed, basal lower ones equally pinnatifid on both sides, 1 cm. or more broad. Lower-side with dense, yellow or pale yellow-powder. *D. michelii* Christ is a coarse form without free pinnules -- Christensen.
(P. 247).

4. *Doryopteris duclouxii* Christ, Bull. Geogr. Bot. Man. 231, (1902); Matthew 359 (1911).

Doryopteris muralis Christ, Bull. Geogr. Bot. Mans. 111. 1904.
Doryopteris mairei Bause, Hedwigia 54: 206, t. 4. J. 1914.

Rhizomes short, provided with atratous subulate scales; stipes fasciculated, 12-18 cm. long, rigid and like rachis and costa ebeneous; fronds deltoid-pedatifid rarely pinnato-pedatified, 8 cm. long and broad, caudato-acuminate, tripartite, the central one 2 or 3 lobed, oblong-acuminate, entire, decurrent with wing along the rachis 1 cm. broad, the upper lateral parts entire, 2-4 lobed downward, lobes deflexuous, spreading, entire, 3½ cm. long, rarely the lateral parts freely separate by a wing, 2 cm. long, and more rarely so in the upper lateral lobes; lobes ½ cm. long, margin entire, sinuses acute; sori continuous, ½ mm. broad, tawny circumcinate, inducium very narrow, continuous denticulate; texture rigid, coriaceous; color light green.

Yunnan, Kweichow.

All pinnae of the fertile leaves are generally connected at the base, rarely 2-5 pairs of free pinnae are to be found; upper pinnules of the basal pinnae sometimes quite obsolete, or short and connected at base, the lower ones generally entire, sometimes the basal ones with two. Generally without powder on the under side of the pinnae but sometimes thinly farinose by a pale-brown powder---Christensen.

Closely allied to Cheilanthes argentea var. *obscura*, differs by only being less divided.

5. *Doryopteris pedata* (L.) Fee Gen. Fil. 133, (1850-52); NPfl. 270.

Pteris pedata L., Sp. 2. 1075, 1753; HKBK. 167 (pt.); Christ 162.
Pteris palmata Willd., 1810; HKBK. 166.
Litobrochia palmata J. Sm., 1841.

Stipes 30 cm. or more long, erect, nearlynaked, polished, chestnut-brown; frond 10-23 cm. each-way, the barren ones with a broad undivided centre and five or more triangular lobes, of which the terminal one is the largest, the lowest deflexed and the sinuses rounded; fertile frond-cut down to a broadly winged centre into linear lobes, of which the upper ones are entire and the lower ones again

cut on the lower side, the longest entire ones 3-4 in. longest entire ones 3-4 in. long, ¼-3/8 in. broad; texture thick and coriaceous; rachis and both surfaces naked; costae black and polished; veins anastomosing copiously; sori continuous to the apex of the segment.

Tropical America, East India, China: Yunnan (A. Henry).

New to China.

45. Histiopteris (Agardh.) J. Sm. Hist. Fil. 295, (18~~0~~75).

(Pteris.§Histiopteris Agardh.); Rev. Gen. Pter. 76,
(1839).

Type: Pteris incisa Thunb.

Sori linear, submarginal, on a receptacle connecting the veins tips commonly continuous arround the sinuses; indusium linear, consisting of the reflexed modified margin; spores bi-lateral. Fronds at least 2-pinnate; lowest pinnules shorter than the next in order, stipule-like, close to the main rachis; veins free or anastomosing. Rhizomes wide creeping; stipes polished, stramineous to purplish, not articulate to the rhizome.
(P. 248.).

Species 4; 3 endemic in Philippines, 1 common to tropics of both hemispheres, and also in China.

Histiopteris incisa (Thunb.) J. Sm. Hist. Fil. 295, (1875);
NPfl. 294; Matthew 369, (1911).

Pteris incisa Thunb., Prod. Fl. Cap. 171, 1800; HKBK.
172; Christ 163.
Pteris vespertilionis Lab., 1806.
Pteris elegans Sw., 1817.
Litobrochia incisa Presl., 1836.
Litobrochia sinuata Brack, 1854.

Stipes stout, erect; polished, straw-colored or bright-brown, sometimes slightly muricated towards the base; fronds often several feet. long, bi- or tripinnate, only the uppermost pinnas simplypinnate with entire linear-oblong-pinnules, those next in order with numerous pinnatifid-pinnules 5-7.5 cm. long, about 1.8 cm. broad, in opposite pairs, the lowest often quite close to the stem, reduced in size and their segments dilated, the lowest pinnae often very large and compound; texture herbaceous or subcoriaceous; under surface often glaucous; veins free or more or less anatomosing; sori interrupted or continuous, often reaching the point of segments.

Common in tropics of both hemispheres, Borneo, Formosa, China: Kwantung, Kweichow, Kwangsi.

A plant very variable in size, cutting, texture and venation, often scandent.

46. Onychium Kaulfuss Jahr. d. Pharmacie, Berlin (1820) 45; Enum. 144, (1824).

Type: Onychiuum auratum Klf.

Rootstocks creeping, the stipes tufted, not articulate to the root-stock; fronds finely pinnately divided (3-4 times), the sterile and fertile segments more or less dissimilar in shape and size, both slender, the veins free. Sori densely covering the entire back of the frond, the inducium consisting of the reflexed, somewhat modified margin which reaches to or nearly to the costa (midrib); spores grow along the both sides of the midrib and on maturity the inducium splits open lengthwise, thus liberating the spores. (Greek "claw" alluding to the shape of the lobes in some species).

Species 6, mainly in the warmer parts of Asia.

For a time the ferns of this genus are known under Pteris, from which they are different rather in the cutting of fronds and smallness and narrowness of the ultimate segments than essentially in fructifications with inducia extending nearly to the midrib of narrow segments.

Key to species

I. Sterile and fertile fronds almost uniform.....1. O. japonicum
II. Sterile and fertile fronds more or less dimorphic.
  A. Frond ovate, 4-pinnatifid; inducium and spores golden yellow........................2. O. siliculosum
  B. Fronds deltoid, 5-pinnate, inducium gray, spores brownish..............................3. O. cryptogramminoides.

1. Onychium japonicum (Thunb.) Kze. Bot. Zeit. (1848) 507; NKBK. 143;
(P. 249).

Christ 155; Matthew 375, (1915).

Trichomanes japonicum Thunb., Fl. Jap. 340, 1784.
Caenopteris japonica Thunb., 1795.
Darea japonica Willd., 1810.
Leptostigia lucida Don, 1825.
Cryptogramme japonica, Prantl., 1882; NPfl. 279.

Stipes 15-30 cm. long, stout, erect, naked, straw-colored r pale-brown; fronds 30 cm. or more long, 15 cm. broad, ovate, uadripinnatifid; lower pinnae 10-15 cm. long, subdeltoid, innules and segments numerous, usually deltoid, the copious near-mucronate ultimate divisions 3-4 mm. long, nearly uniform

in the barren and fertile frond; texture herbaceous or, when mature, subcoriaceous; rachis and both surfaces naked; inducium pale, membranaceous; sori brown.

Malaya, N. India, Japan, Formosa, Korea, China: Yunnan, Hainan. Chekiang, Fukien, Kwantung, Kwangsi, Szechwan, Shensi, Kansu, Kiangsi, Anwhei, Hupeh.

2. *Onychium siliculosum* (Desv.), C. Chr. Ind. 20, (1905), 469, (1906); Matthew 375, (1911).

Pteris siliculosa Desv., Berl. Mag. 5. 324, 1811.
Phorolobus siliculosum Desv., 1827.
Cyptogramme aurata Pranlt., 1882; NPfl. 279.
Pteris chryrocarpa HK. et Grev., 1829.

Stipes 15-30 cm. long, stout, erect, 30 cm. or more long, 15 cm. broad, ovate, quadripinnatifid; lower pinnae 10-15 cm. long, subdeltoid, erecto-patent; pinnules and segments numerous, usually deltoid; ultimate divisions of the sterile frond often obovate-cuneate, trifid at the apex, mot more than 2 mm. long, 2/3-½ mm. broad, when entire, coriaceous in texture, of the fertile fronds podlike, 0.6-2.5 cm. long, 3 mm. broad; rachis and both surfaces naked, the membranaceous inducium and copious sori are rich golden-yellow.

Widely distributed in Philippines, India, Malaya, Formosa, China: Hupeh.

3. *Onychium cryptogrammoides* Christ, Not. Syst. I. 52, (1909); Matthew 375, (1911).

Rhizomes thick as a raven's quill, long-creeping, densely radicose clothed with dark-brown, subulate short scales; leaves solitary or 3-5 fasciculated; stipes clothed at base with sparce black scales, base black, the upper part, like rachis and costa, stramineous, (glabrous in entire plant), slender, flexuouse, 15 cm. long rarely longer; lamina deltoid-ovare, 12 cm. long, 9 cm. broad, 5-pinnate; pinnae and pinnules petiolate, erect; pinnae about 10 on each side, the lower ones much the largest, ovato-fastigiate, quadripinnate; pinnules very confert, petiolulate; ultimate segments very numerous, forked, the uppermost ones sterile linear, acute, 2 mm. long, 0.33 m. broad, the others fertile, oblong, siliquiform, unguiculate, 3 mm. long, 1 mm. broad; sori lanceolate, near costules, inducium of the same shape, contiguous, gray. Texture softly coriaceous, color stramineous green.

Kashmir to Yunnan.

47. Pteris (Tourn.) Linne (Hort. Cliff. 443. 1737) Spec. Plant. 2. 1073, (1753).

Type: Pteris longifolia L.

(P. 250).

Sporangia borne on the thicked ends of free veinlets, forming small and roundish distinct or nearly-contiguous marginal fruit dots, covered by a mostly whitish membraneous, sometimes herbaceous modified and reflexed continuous margin of the frond without an extrorse indusium. Fronds various, at least pinnate, often 2 or 3 pinnate or decompound; the lowest pinnae often most well-developed, especially on the lower side, veins free, forked, or forming areolae along the costa, Terrestial, usually tufted ferns, the stipes not jointed to the creeping or erect fibrous rootstocks. (Greek, ancient name for a fern).

Species about 260 or more in the tropics of both hemispheres; about 30 well-defined ones recorded in China. Many are under cultivation as ornaments for conservatories or house decoration.

Key to species

1. Veins free (Eupteris).

  2. Fronds simply pinnate with simple entire lower primary pinnae.

    3. Fronds 3-5-foliate....................1. *P. deltodon*

    3. Fronds pinnate, pinnae, numerous.

      4. Pinnae cuneate at base, petiolate, 1-2 cm. broad, entire, 3 cm. far apart........... ....2. *P. insignis*

      4. Pinnae auricled at base, sessile, below 1 cm. broad, sharply serrate towards apex, much closer......................3. *P. longifolia*

  2. Fronds furcato-pinnate, i.e. fronds simply pinnate with the lower primary pinnae bi- or tripartite or pinnatifid at least in the barren fronds, on the basiscopic side.

    3. Only lower pinnae mostly with few (2-3), lateral segments near the base, rachis not winged (1).

      4. Rachis broadly winged at least on the upper part..............................4. *P. multifida*

      4. Rachis scarcely winged.

        5. Fertile segments narrowly linear, below 4 mm. broad.

          6. Fronds digitato-pinnate, glabrous; segments 3-4 mm. broad; stipes above 15 cm. long.. ....6. *P. dactylina*

          6. Fronds not digitato-pinnate.

            7. Stipes and rachis glandular-squamose; segments entire.......7. *P. paupercula*

              8. Smaller fern, stipes to 4 cm. long; pinnae below 2 mm. broad.......... ....3. *P. actinopteroides*

8. Larger ferns, stipes much longer; pinnae 4 mm. broad...........................5a. P. henryi
7. Stipes and rachis glabrous; segments serrate towards apex.
5. Fertile segments twice as broad or broader.
6. Texture coriaceous, lateral veins prominent.
7. Fronds uniform lateral pinnae petiolate...............8. P. hui
7. Fronds dimorphic lateral pinnae sessile.
8. Sterile segments above 2.2 cm. broad........9. P. pellucida
8. Sterile segments much narrower................10. P. cretica
6. Texture thin herbaceous, lateral veins inconspicuous.
7. Sterile fronds with 5-7 pairs of pinnae, which 4 cm. broad.....................................11. P. esquirolii (P. 251).
7. Sterile fronds with less than 4 pairs of pinnae, which below 2 cm. broad.
8. Fertile segments to 20 cm. long; leaves almost glaucous.................................12. P. intromissa
8. Fertile segments to 10 cm. long; leaves green.
9. Stipes 40 cm. long, dark-castaneous; pinnae 6 cm. far apart.....................13. P. plumbea
9. Stipes to 15 cm. long, stramineous; pinnae close.................................14. P. ensiformis
3. Lateral pinnae pectinato-pinnatisect throughout into at least 5 lateral segments.
4. Fronds dimorphic; lateral pinnae 1-2 on each side below the terminal one; rachis winged.
5. Only the lowest one pair of pinnae in the sterile frond pinnatifid..15. P. dimorpha
5. At least the lower 2 pairs of pinnae pinnatifid..........................16. P. grevilleana
4. Fronds usually uniform; lateral pinnae more numerous, at least more than 4 on each side; rachis not winged.
5. Pinnae pinnatifid on the lower side only..........................17. P. semipinnata
5. At least the lower pinnae pinnatifid on both sides...................18. P. dispar
2. Fronds bipinnatifid down to the costa.
3. Pinnae simply pinnatifid.
4. Pinnae linear-lanceolate, 2 cm. broad, with long-caudate serrate apex.....................................19. P. decrescens

4. Pinnae oblong-lanceolate, above 4 cm. broad, apex not long-caudate............20. *P. longipinnula*
3. The lowest pinnae forked at the base into 2 almost similar pinnules.
4. Fully developed fronds over 150 cm. long.
5. Ultimate segments cut almost down to costa, 5 cm. long, 1 cm. broad, shortly acuminate ....21. *P. excelsa*
5. Frond much large; stipes and rachis not rose-lilac, but stramineous.
6. 24. *P. quadriaurita*

5.

25. *P. fauriei*

1. Veins more or less anastomosing.
2. Fronds pedately 7-sect; stipes ferruginous tomentose. ....26. *P. tomentella*
2. Fronds not pedately divided; stipes glabrous.
3. Fronds pinnate, lower pinnae not much larger than the next higher ones.
4. Fronds small or medium-sized, under 100 cm. long..........................27. *P. biaurita*
4. Fronds large, more than 100 cm. long...28. *P. geminata*
3. Fronds tri-partite, the lateral branches sometimes nearly as long as the central one.
4. Ultimate segments to 2 cm. broad...29. *P. wallichiana*
4. Ultimate segments 2-4 mm. broad..30. *P. tripartita*

(P. 252).

1. *Pteris deltodon* Baker in Journ. Bot. 26: 226 (1888); C. Chr. Ind. 596 (1906); Matthew in Journ. Linn. Soc. 39: 389 (1911).

Pteris nana Christ, C. Chr. Ind. 603 (1906).
Pteris trifoliata Christ, Bull. Boiss. 7: 7 (1899); Diels in Nat. Pfl. Fam. I. 4. 292 (non Fee 1857).

Rhizome short, erect, densely-fibrous-rooted; stipes tufted (4-7), slender, naked, shining stramineous, 10-30 cm. long; frond deltoid-ovate, simply pinnate, with thick coriaceous texture, 10-20 cm. long, green and glabrous on both sides; pinnae 3-5 with terminal one much the largest oblong-ovate to broad lanceolate, 5-15 cm. long, 1.2-2.5 cm. broad in the middle, sessile except the terminal one, which is cuneate at base and usually shortly petiolate, conspicuously inciso-dentate at the sterile tips, which is acuminate in the terminal pinna, and usually acute in the lateral ones; veins lax, branching at angles of 75° from the costa, simple or forked, very distinct; sori continuous from the base up to within a short distance of the tip of pinnae, inducium narrow, glabrous, dark-brown.

Szechwan, Kweichow, Yunnan, Kwantung.

This species is nearest to *Pteris cretica* L. from which differs by but fewer pinnae of which the lowest are simple, the serrations in sterile parts are also different and further differs by laxer veins. The frond is generally trifoliate but larger forms often have five leaflets with the lower pair separate from the one next above by a wingless rachis about 1-2 cm. long. *Pteris nana* Christ from Yunnan is perfectly identical with Baker's type from Omei Shan, Szechuan differing only by somewhat broader pinnae. A specimen, No. 8366, in Hongkong Herbarium from Kwangtung (without precise locality!) appears almost congeneric with the present species, differing only by perfect entire sterile pinnae. *Pteris nana* Christ var. *quinquefoliata* Copel. from Fukien, a larger plant than the type having lateral pinnae cleft at the base, should be called *P. deltodon* Baker var. *quinquefoliata* (Copel.) Ching, if it not represents a more vigorous form of *P. cretica* L.

2. *Pteris insignis* Mett.; Kuhn. JoB. 269, (1868); Matthew 389 (1911).

Rhizomes blackish; leaves chartaceous, olive-green when dry, very glabrous, pinnatisect; stipes 10 cm. long and like rachis stramineous, smooth fronds 23-45 cm. long, ovate or ovate-oblong; segments 6-12-jugate, petiolate, patent; the sterile ones to 20 cm. long, over 2.5 cm. broad, the fertile ones 10-15 cm. long, 12-1.6 cm. broad, base rounded or cuneate, linear-elongated, long or shortly acuminate; very entire; the upper ones decrescent, sessile, the terminal one similar to the lateral ones, costa rather plane above veins very patent, forked, about mm. distant; margin revolute, rather broad, very entire, paraphysis numerous.

China: Kwantung.

3. *Pteris longifolia* Linn. Sp. 2. 1034, (1753); HKBK. 153; Christ 165; NPfl. 292; Matthew 389, (1911).

Pteris vittata L., 1753.
Pteris ensifolia Poir., 1804.
Pteris costata Bory, 1810.
Pteris tenuifolia Brack., 1854.
Pteris diversifolia Sw., 1806.

Stipes 15-30 cm. long, stout, erect, pale, more or less clothed below with pale-brown linear scales; fronds 30-60 cm. long, 10-25 cm. broad; oblong-lanceolate, attenuated below; pinnae sessile, often 20-30 on each side, 7.5-15 cm. long, 3-9 mm. broad, linear, entire,
(P. 253).
truncate or cordate or sometimes slightly auricled at the base; texture subcoriaceous, rachis naked, or slightly scaly below or throughout, both surfaces naked; veins close and fine, usually ones branched indusium membraneous, yellowish-brown.

Widely dispersed over tropical and warm temperate regions of the world; India, Japa, Formosa, Hongkong, China: Shensi, Szechwan, Hupeh, Chekiang, Kwantung, Yunnan, Anwhei, Hainan.

4. Pteris multifida Poir. Enc. 5. 714, (1804); Matthew 389, (1911).

Pteris serrulata L. fil., Suppl. 445. (1781); HKBK. 155; Christ 166; NPfl. 292.

Stipes 15-23 cm. long, rect, wiry, naked, pale or brownish; frond 10-45 cm. long 15-23 cm. broad, ovate, bipinnatifid, the main rachis margined with a wing which is 3-4 mm. broad at the top and grows gradually narrower downwards; pinnae in six or more distant opposite pairs, the uppers ones simple, often 10-15 cm. long, 3-6 mm. broad, the lower ones with several long linear erecto-patent pinnules on each side, the edge of the sterile ones spinuloso-serrulate; texture scarcely coriaceous; rachis and both surfaces naked; veins clearly visible, simple or once forked, about 2 mm. apart at the base; indusium narrow, membranaceous.

Natal, Hongkong, Korea, China: Shensi, Kansu, Kiangsu, Szechwan, Hupeh, Kweichow, Kiangsi, Chekiang, Anwhei, Kwantung.

5. Pteris actiniopteroides Christ in Bull. Boiss. 7: 6 (1899); Diels in Nat. Pfl. Fam. I. 4. 292; C. Chr. Ind. 591 (1906); Matthew in Journ. Linn. Soc. 39: 388 (1911); C. Chr. in Medd. Göteb. Bot. Trädg. I. 96 (1924).

Rhizome short; stipes in dense tufts, upright or spreading, slender, angular, 3-6 cm. long, reddish-stramineous or light ebeneous, polished; frond dimorphous, the sterile one much shorter than the fertile cuiquefoliate, the fertile one 7015 cm. long, broadly deltoid, bipinnate, pinnae 2-3 on each side under the tri-foliolulate terminal one, the basal ones shortly petiolate, usually 2-3-forked, the middle ones either forked or simple, the uppermost ones always simple; segments equal, linear- 4-6 cm. long, 1-2 mm. broad, margin entire except the apex, which is usually sharply serrate, texture chartaceous, glossy entirely glabrous; rachis reddish; indusium rather broad (½ mm. broad), whitish, continuous with entire margin, not extending to the serrated apex of the segment.

Yunnan, Szechwan, Hupeh.

A very interesting little ferns, which is in habit somewhat intermediate between P. multifida Poir. and P. dactylina Hk., from both of which differs, however, by smaller size, very narrow fertile segments and costaneous stipes and rachis. It was first collected in Mengtze, Yunnan, by A. Henry and reported over since from Szechwan and Hupeh. ~~Accc~~ According to Christensen, in Meddel. Göteb. Bot. Trädg. I: 96 (1924),

the plant from S. Szechwan grows to 40 cm. tall including the stipe, with 6-7 pairs of lateral pinnae under a fan-shaped apex, consisting 7 segments; but all the specimens, No. 2065, collected by Prof. K. K. Tsoong (1921) on Tai Hwa Shan, Yunnan, perfectly agree with Christ's type in dimension, and evidently a common fern, growing in the crevices of exposed rocky cliff as his notes indicate.

5a. Pteris henryi Christ, Bull. Boss. 6: 957 (1898).

(P. 254.).
Very similar to Pteris dactylina HK., but pinnae not palmately spring out from the apex of stipe; pinnae like those in P. cretica, 4 mm. broad, papery, apex long-caudate, very finely toothed.

Yunnan.

6. Pteris dactylina HK. Sp. 2, 160 t. 130 A. (1858); BKBK. 155; HPfl. 292; Matthew 389, (1911).

Pteris henryi Christ, Bull. Boiss. 6. 957, (1898); Matthew 389 (1911).

Stipes 15-23 cm. long, slender, wiry, naked, straw-colored; fronds consisting of 3-6 linear slightly serrated pinnae, 5-15 cm. long, 3-4 mm. broad, which issue from at or near the same point, sometimes the two outer ones from a little below the others; texture coriaceous, both surfaces naked; veins conspicuous, simple or forked, usually about 2 mm. distant from one another at the base; indusium broad, pale.

N. India, China: Yunnan, Szechwan --- Omei Shan.

7. Pteris paupercula Christ in Bull. Geogr. Bot. Mans. (1906) 131; C. Chr. Ind. Supl. 67 (1906-13); Matthew in Journ. Linn. Soc. 39: 389 (1911).

Rhizome thick, short, densely clothed in brown lanceolate subulate scales and so is the stipe; leaves densely fasciculate, numerous; stipes erect, reddish-stramineous, teret, rigid and like rachis densely asperous with subulate and setaceous sort spreading brown slender scales, falling off at distance of 2-3 cm. above the base; stipes of sterile leaves 6 cm. long, those of the fertile 15 cm. long, the sterile frond 6 cm. long, 3 cm. broad, oval-oblong, bipinnatifid; pinnae remote, about 5 on each side, the lowest shortly petiolate, cut down nearly to the costa with lower segments forked again, the upper ones adnately decurrent, simple or forked, segments obtuse, [illegible] cm. long and broad, bipinnate; pinnae remote, 5-6 on each side, the lower ones pinnate into 3-6 pinnules, the upper ones simple, pinnules linear, 4-5 cm. long, 2-3 mm. broad, acute, entire;

veins hidden, twice or thrice forked; color light green, surfaces glabrous, opaque, texture herbaceous somewhat pellucid. Sori continuous to the apex, 1 mm. broad indusium membranaceous narrow, lacerato-fimbriate.

Szechwan.

A remarkable fern discovered by E. H. Wilson in W. China, 1903. In habit it closely allied to P. ensiformis Burm. but differs by small dimension, much less pronounce dimorphism between the fertile and sterile leaves and, particularly by densely scaly reddish-brown stipes and rachis and double crenulate pinnules of the sterile leaves.

8. Pteris hui, Ching, Sinensia 1; 9 (1929).

Rhizome very short, upright; paleae linear-subulate dark brown, rather thick, 2-4 mm. long. Stipes tufted, 4-8 together, naked, stramineous more or less flattend upon drying, broadly channelled above, 6-17 cm. long, 2 mm. broad. Fronds short deltoid, uniform, bipinnate, 5-10 cm. long, a little less broad, glabrous on both sides. Lateral pinnae 1-2 pairs, opposite, petiolate; the lower pair much the largest, with petioles 5-10 mm. long, 2-3 partite, pinnules oblong-lanceolate to oblong-ovate 2.5-6 cm. long, 1.5-2 cm. broad in the middle, shortly petiolulate or subsessile, distinctly inciso-dentate on the upper sterile portion; the middle pair (if there any) simple, shortly petiolate or subsessile,/ distinctly inciso dentate on the upper sterile portion; the middle~~p~~ of same shape and size as the lower one; the terminal pinna always simple, of same shape, but much longer (=9 cm.) more or less petiolate; rachis stramineous, naked, wingless; texture thick, stiff, coriaceous; shining light green (when living); midrib prominently raised below, rather flattened above, lateral veins numerous distinctly raised above, spreading-patent, forming 75° to the midrib, 1-1.5 mm. apart, ended near the base of the teeth, never in the mucron. Sori dark brown, linear, continuous from base to within a short distance from the tip, or only up to the middle of the margin, or sometimes only a short way upward from the base, indusium narrow, rather thick, rigid, dark gray, continuous.

Kwangsi.

A distinct member of the group cretica, near P. deltodon Bak. in habit, differs in bipinnate frond with petiolate pinnae, which are again 2-3 partit in lower pair, and less prominent lateral veins.

9. Pteris pellucida Presl. Rel. Haenk. I. 55, (1825); HMBK. 154.

Pteris venulosa Bl., 1828.
Pteris venusta Kze., 1848.

Stipes 30 cm. or more long, erect, naked, straw-colored or brown; fronds 30-45 cm. long, ovate-lanceolate, simply pinnate; pinnae usually in 3-6 sessile pairs, linear, entire or or serrated towards the point, the upper ones slightly decurrent, the lower ones often 20 cm. long, 2.5 cm. broad, usually all simple, but occasionally the lowest forked; rachis naked; texture coriaceous, both surfaces bright green, often glossy; veins conspicuous, fine, close (about three to 2 mm.), simple or once forked; Indusium membraneous, brownish.

Himalayas, India, Malaya, Philippins, Guinea Coast, Hongkong, China: Kwantung.

10. Pteris cretica L. Mant. 130, (1767); HKBK. 154 (excl.   ); Christ 165; NPfl. 295 Matthew, 388 (1911).

Pteris nervosa Thunb., 1784.
Pteris pentaphylla Willd., 1810.
Pteris triphylla Mart et Gal., 1842.
Pteris treacheriana Baker, 1879.

Stipes 12-30 cm. long, erect, wiry, naked, stramineous, or pale-brown, polished, fronds 15-30 cm. long, 10-20 cm. broad; lateral pinnae usually 2-6 opposite sessile pairs, of which the upper one is sometimes a little decurrent, 7.5-12 cm. long, 3-10 mm. broad, the sterile ones considerably the broadest ad spinuloso-serrated, the lower pair shortly petiolate, often cleft down nearly to the base into two or three linear pinnules; rachis and both surface naked, texture coriaceous; veins fine, close, parallel, simple or once forked; indusium pale, membraneous.

Europe, America, Asia, Natal, Cape Colony, Caucasus, Persia, Formosa, Japan, Philippine, China: Honan, Shensi, Kansu, Szechwan, Hupeh, Chekiang, Yunnan.

Var. rosthornii Diels, Engl. Jahrb. 29. 202, (1900); Matthew 388, (1911).
Pinnae remote, about 6 on each side, elongated, linear, 20 cm. long, 0.8 cm. wide, serrate only in the apex.

Var. subumbrosa Christ, Bull. Geogr. Bot. Man. 151, (1907);
(P. 256).
Matthew 388., (1911).

Fronds fasciculated; stipes slender, glabrous, stramineous sulcate, plane upward, over 10 cm. long; fronds 20 cm. long, base equal, broadly deltoid, pinnate with bipinnate base, basal pinnae remote, the upper ones close, about 4 on each side, erecto-patent, sessile, base subtruncate; 1½ cm. broad, 10 cm. or more long, narrowly lanceolate, acuminate densely serrulate, the lowest pinna quadrifid, segments bifid, the upper ones simple, the fertile pinnae narrower,

otherwise similar; veins free, conspicuous, 1 mm. apart, usually binate from the base or forked from the middle; texture subcoriaceous, surfaces almost shinning; sori impressed, 1 mm. broad continuous from the base to a short distance below the apex which is distinctly serrulate brown; inducium persistent gray but soon involute.

Yunnan.

Var. *subserrulata* Christ Bot. Gaz. 51. 375, (1911).

Differs from the type in leaves being papyraceous, not subcoriaceous, dimorphic, the fertile ones strongly narrowed, the sterile much larger, the lower pinnae bi- or tripartite lateral pinnules abbreviate, the upper rachis broadly winged, the margin of the wing acute and coarse biserrate.

Hupeh - Fan Hsien.

11. *Pteris esquirolii* Christ, Not. Syst. I. 50, (1909); Matthew 389, (1911).

Sterile fronds 28 cm. long, 20 cm. broad, rotundo-ovate, pinnate, base bi-pinnatifid, pinnae 4-jugate under the terminal pinna, almost equal in size; stipes rigid, 20 cm. or more long, thick as raven's quill, lucid, brown-stramineous; pinnae imbricato-confert, sessile, alternate, the upper ones shortly decurrent, the lowest cut almost down to the base, ovate-elongate, base equal, ovato-cuneate, acuminate, erecto-patent, to 23 cm. long, 4 cm. broad, undulate, apex caudate and coarsely serrate; rachis and costa lucid, fulvo-stramineous; veins prominent, oblique, 1 mm. apart, usually furcate in the basal and middle ones, margin cartilagineous fertile fronds strongly elongate, 40 cm. long, 5-7-jugated; stipes 60 cm. long, thick as goose's quill, pinnae much remote, base successively tri- and bi-parted and strongly contracted, linear, to 25 cm. long, 1.5 cm. broad; midrib 1.3 or 2 mm. thick; sori 1 mm. broad continuous almost to the apex of pinnae, brown; indusium very narrow, gray; texture herbaceous or papyraceous, subshining, color light green.

Kweichow, Yunnan.

A large form of *P. pellucida*, differs by its dimorphism of leaves, more distant and oblique veins, texture being herbaceous and broad almost flabellate sterile frond. The lateral veins in P. pellucida is rather crownded and more horizontal.

12. *Pteris intromissa* Christ, Phil. Journ. Sci. Bot. 2. 173, (1907).

Resembling Pteris cretica, differs by narrower pinnae and broadly decurrent segment, obscuro or plumbeous-green, almost glaucous, opaque, texture thin papyraceous, sori very narrow, veins very slender and almost invisible. Rhizomes short, radicose; stipes fasciculate, thin, rufo-stramineous opaque; fronds 30 cm. long and broad, apex ternate pinnate below the ternate apex, pinnae opposite, middle ones simple, the lowest ones deeply bi- or tri-parted, decurrent, linear-lanceolate or linear-caudate, 20 cm. long, sterile ones 12 mm., the fertile 6 mm. broad, sterile acutely serrate from apex to base, fertile ones acutely
()P. 257).
serrated at the apex only, veins very fine, slightly distinct, simple or forked, oblique; sori and indusium very narrow, 0.7 mm. broad; texture thin-papyraceous, color opaque obscurely green, subglaucous.

Luzon, Philippine Island, China: Swatow.

13. Pteris plumbea Christ, Not. Syst. I. 49, (1909). Matthew 390, (1911).

Rhizomes black, oblique, short, radicose; stipes 40 cm. long angular, slender but rigid, dark-castaneous; fronds 20 cm. long, 17 cm. broad, pinnate, 2-3-jugate under the terminal pinna; pinnae remote, the lower ones 6 cm. distant, (or triparted) biparted almost down to the base, all provided with narrow decurrent linear-ligulate wing, base cuneate and ovate, almost sessile, 11 cm. long, 1 cm. broad, obtuse, obscurely crenulate towards apex, margin undulate; veins over 1 mm. apart, forked from base and inconspicuous; sori very narrow, scarcely 0.5 mm. broad, often interrupted or else with free apex; texture papery, color bluish-lead, opaque.

Philippine, China: Swatow, Kwantung.

Nearest to Pteris cretica, differs in stipes being of mahogany color, and separate pinnules, being longish decurrent, narrowly linear and often obtuse.

14. Pteris ensiformis Burm. Fl. Ind. 230, (1768); HKBK. 155; Matthew 389, (1911).

Pteris crenata Sw., 1801.
Phorolobus chinensis Desv., 1827.
Pteris chinensis var. victoriae Baker, Gard. Chr. III. 7. 576, 1890.

Stipe 7.5-15 cm. long slender, erect, naked, straw-colored; frond 15-30 cm. long, 7.5-15 cm. broad, with a long terminal pinna and 2-4 pairs of lateral ones, those of the fertile frond slightly compound, the central portion 5-10 cm. long, 6 mm. or less broad; entire, the upper ones of

the sterile frond decurrent, the lower ones subdeltoid, cut down to the rachis below into 2-6 ovate-oblong sharply toothed pinnules, which are often 9 mm. or even 1.2 cm. broad; texture subcoriaceous; rachis and both surfaces naked, veins not very conspicuous, usually once or twice forked.

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Tropical Australia, Hindston, Himalaya, Ceylon, Chusan, Loochoo Islands, Japan, Hongkong, Corea, China: Chekiang, Kwangtung, Hainan.

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15. Pteris dimorpha Copel. in Phil. Journ. Sci. Bot. 3: 282 (1908); C. Chr. Ind. Suppl. 66 (1906-12); Matthew in Journ. Linn. Soc. 39: 589 (1911).

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Rhizome short, ascending, about 4 mm. thick, densely fibrous rooted, clad at the apex in minute subulate castaneous scales; stipes shining, reddish towards the base, dark stramineous upward, narrowly winged on the uppermost part; frond strongly dimorphous, the sterile ones 10-15 cm. long, the fertile 25-30 cm. long, the sterile oblong-deltoid, tripartite, glabrous, of papyraceous texture, shining light green on both surfaces; lateral pinnae ovate, falcate, to 5 cm. long, deeply incised, segments about 5 on each side, close, oblong, obtuse, the terminal one much the largest to 2 cm. long, sharply serrate or subentire, the middle pinna the largest to 10-15 cm. long and 3-4 cm. broad, broad lanceolate, gradually acuminate, with 6-10 segments on each side, the lowest ones reduced and narrowly decurrent along the rachis; fertile frond 10-15 cm. long (sometimes only 5 cm. long),
(P. 555).
pinnate like Pteris ensiformis Burm. with 1-2 pinnae on each side under the terminal one, the lowest ones forked or simple, 6 mm. broad, all decurrent in a narrow wing, the terminal pinna the largest, to 10 cm. long, often irregularly pinnatifid; Inducium narrow, continuous to the blunt serrate apex, dark gray.

Kwangtung,

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This distinct and rather uniform species was first discovered by Dr. Charles G. Matthew of the British Navy in the mountains in southern Kwangtung, and later in 1927 was collected in the mountain North River by Prof. W. Y. Chun, of Botanical laboratory, Canton whose copious materials have been recently received by me. The specimen matches the type very well, except that it show somewhat less dimorphism and in this respect it may be well considered as an intermediate between P. multifida Poir and P. ensiformis Burm.

16. Pteris grevilleana Wall. List n. 2680, (1829); Clarke, Tr. Linn. Soc. II. Bot. I. 466 t. 54, (1880); Matthew 589, (1911); Bedd. Handb. 112.

Stipes stramineous or chestnut-brown, polished; fronds dimorphic, barren stipe shorter, winged towards the apex; barren fronds pedately 5-fid, scarcely pinnate, segments oblong, approximate sometimes over-lapping, margin spinulose-serrate; fertile fronds with 5 narrower, much longer lanceolate pinnae, the lower pair biparted, veins exceedingly obscure, segments much narrower than in the sterile, somewhat distant, 1.5 cm. long, 3 mm. broad, linear-oblong, falcate, often broader upward, obtuse, serrated of barren apex only.

Allied to Pteris quadriaurita, except that the fronds are dimorphic.

India, Siam, Borneo, Luzon, Formosa, China: Hainan, Yunnan, Fukien.

17. *Pteris semipinnata* L. Sp. 2. 1076, (1753); HKBK. 157; Christ 166; NPfl. 292; Matthew, 390 (1911).

Pteris dimidiata Willd., Sp. 5. 381, 1810.
Pteris inaequalis Baker, 1875.

Stipes 30 cm. or more long, strong, erect, naked, bright chfrstnut-brown; frond 30-45 cm. long, 15-23 cm. broad, ovate lanceolate, the upper parts cut down nearly to the rachis into numerous close entire linear lobes, the largest of which are 3.7-7.5 cm. long, 6-12 mm. broad, the lower two thirds with 6-8 pairs of opposite distantly placed pinnae, the largest of which are 7.5-15 cm. long, with a long linear entire point and a broad entire wing on the upper side of the rachis, but the lower side regularly pinnatifid into several linear pinnules 2.5-5 cm. long, 6 mm. broad; texture scarcely coriaceous, sterile segments finally serrated; rachis and both surfaces naked; veins simple or once forked, 3 mm. apart at the base. Indusium membranaceous.

Hongkong, Japan, Loochow, Formosa, Korea, China: Kweichow, Hainan, Kwantung, Chekiang, Szechuan, Hupeh, Kiangsi, Anhwei, Kiangsu.

f. *subaequilatera* Ros. Fedde Repert. 13. 121, (1914).
Pinnae regularly pinnatifid on each side.
Corea, Japan, Luzon, China: Kweichow.

f. *inaequilatera* Ros., Fedde Repert. 13. 121. (1914). (T. 258).
Lateral pinnae entire or slight irregularly lobed on the upper side of the rachis.
Corea, Japan, China: Kweichow, Yunnan.

18. Pteris dispar Kze. Bot. Zeit. /539, (1848); Nos. Fedde Repert. 13, 121, (1914).

Pteris semipinnata L. var. dispar Bk., Hk.Bk. 157; C. Chr. Ind. 607, 1906.

Habit of Pteris semipinnata L. but differs in the pinnae being more or less pinnate on the upper side of the costa into smaller, pinnules; rachis brown and the lateral veins projecting prickly beyond the teeth; while Pteris semipinnata with pinnae provided with an entire wing on the upper side of the costa, pinnules much larger, rachis lighter colored and veins ended in the teeth.

Yunnan, Szechwan, Hunan.

This species is better considered as P. semipinnata var. dispar. (Kze.) Bk.

f. inaequilatera in latera Nos. Fedde Repert. 13. 121, (1914).

Lateral pinnae entire or slightly irregularly lobed on the upper side of the costa.

Corea, China: Kweichow.

f. subaequilatera Nos. Fedde Repert. 13, 121, (1914).
Pinnae regularly pinnatified on both sides of the costa.
Kweichow: Pin-fa.

19. Pteris decurrens Christ. Bull. Geogr. Bot. Man. 244, (1908); Matthew 489, (1911).

Rhizomes short, erect, covers with rigid setaceous black short scales; leaves few, fasciculated; stipes slender, rigid, sulcate, rupostramineous, rachis roughened with minute warts, 15 cm. long; fronds 32 cm. long, 20 cm. broad at the middle, oblong acuminate, pinnae erect patent, about 6 on each side below the much produced terminal pinna 14 cm. long, remote, the middle ones the longest (13 cm.), gradually shortened towards base, the lowest ones 7 cm. long, sessile, adpressed on rachis and dilated on the posterior side at base, 4 cm. long, with very long-produced caudate serrulate apex; pinnules pectinate, about 30 on each side, linear-lanceolate 2 cm. long, 4 mm. broad, obtusish, entire or minutely serrulate, veins close, oblique, the lower ones forked; sori confined to the middle portion of pinnules, scarcely 1 mm. broad, brown, indusium thin, grayish; texture thin or rather rigid, color light green, both surfaces rather shining, smooth.

Kweichow, Yunnan.

Var. remotipinnulata Ching, Sinensia, 1: 10 (1929).

This variety differs from the type in pinnules being widely separate by broad interstices.

Kwangsi

Pteris decrescens Christ is rather a fairly common plant in N. W. Kwangsi, and my No. 5423, 6639 and 6745 perfectly agree with Christ's type from Kweichow in having closely pectinate lateral pinnae.
(P. 260).
20. Pteris longipinnula Wall. List. n. 168, (1828); Ag. Rec. 19, (1839); Hance. 158; Matthew 389, (1911).

Pteris umbraculifera Mett.; Miq. 1868-1869.

Stipes erect, naked, 30-60 cm. long, yellowish-green; fronds 60-90 cm. long, 30-45 cm. broad, the terminal pinnae 30 cm. or more long, 5-7.5 cm. broad, with numerous spreading, entire, blunt, linear lobes on each side, which are 3.7-5 cm. long and reach down nearly to the rachis at the base, the point caudate; lateral pinnae several on each side, similar to the terminal one, the lowest 5 cm. apart, sometimes forked; texture subcoriaceous; rachis and both surfaces naked; veins once forked, 3 mm. apart at the base; sori continued ~~nrly~~ nearly to the apex of the segments.

Jamaica, Japan, India, Birma, Malesia, China: Hupeh, Kweichow, Yunnan, Szechwan, Shensi.

21. Pteris excelsa Gaud. in Freyc. Voy. Bot. 388 (1824); Hk. Sp. Fil. II. t. 136; Hk. Bk. Syn. Fil. 159; Bedd. Ferns S. Ind. t. 213, Handb. 114 (1883); Christ Farnkraut. Erde. 167; Diels in Nat. Pfl. Fam. 1. 4. 292; C. Chr. Ind. 597; v. A. v. R. in Malay. Ferns 368 (1908); Matthew in Journ. Linn. Soc. 39: 389 (1911).

Pteris terminalis Wall., List 101 (1828); Ag. Rec. 20 (1839).

Rhizome short, thick, erect, densely clothed in narrow lanceolate brown scales; stipes tufted, stout, to 90 cm. long, 6-10 mm. thick erect, naked, glossy, green or stramineous or brownish scales sparse and brown; frond 1½-2 m. long, broadly deltoid, terminal pinna to 30 cm. long or longer, 7.5 cm. broad, cut downto costa into numerous rather closely placed falcate lanceolate segments on each side 4 cm. long, 6-10 mm. broad, acuminate, narrowly decurrent, slightly serrated on the barren parts, lateral pinnae 5-10 on each side, similar to the terminal one, the lowest much the largest, over 30 cm. long, 15 cm. apart, oblong-lanceolate, pinnatifid down to the rachis under the entire lanceolate caudate apex, sometimes forked in the basal pinnae; texture chartaceous, light green above, pale or glaucescent beneath, naked on both surfaces; veins once-forked, 3 mm. apart at the base; sori not reaching the apex of the segments, indusium gray, membranaceous, entire.

India, the Philippine Islands, Malayas, Sandwich Islands, Corea China: Szechwan, Yunnan, Kweichow, Hupeh, Kwangsi.

22. Pteris decussata J. Sm. Jour. Bot. 3. 405, (1841); Matthew 389, (1911).

= Pteris patens Hk., Sp. 2. 177 t. 137, 1858; HKBK. 165; Christ, 168; KPfl. 284.

Stipes 30 cm. long or more, erect, naked, glossy, chestnut brown; fronds ample, 1-1.33 m. long, 60 cm. or more broad; terminal pinna 15-23 cm. long, 2.7-5 cm. broad, with several narrow linear lobes on each side, which are widened suddenly on both sides within a short distance of the base, the barren ones slightly serrated; lateral pinnae numerous, similar but larger, sometimes 45 cm. long, 5 cm. broad, the lowest forked, texture scarcely coriaceous; rachis and both surfaces naked; veins oblique, not conspicuous, usually once forked, 2 mm. apart at the base; sori continued nearly to the end of the segments.

Ceylon, Borneo, Celebes, India, Philippines, Samoa, Society Islands, China: Yunnan.

23. Pteris roseo-lilacina Hieron. Hedwigia 55. 350, (1914). (P. 261).

Rhizome superficial, short-ascending, about 1 cm. thick, densely scaly, scales subcordate elongato-deltoid, gradually narrow and very acute at apex, to 4 mm. long, scarcely 1 broad at base, reddish-castaneous, with yellowish-pellucid, narrow, irregularly lacerato-denticulate margin. Leaves to 30 cm. long, stipe shorter, 13 cm. long, 2 mm. thick and scaly at base, (scales similar to those on rhizome), compresso-tetragular, terete and stramineous below, tri-sulcate, rosy-lilac beneath or both sides; rachis similar to petiole, rosy-lilac on both sides, lamina ovate 16-18 cm long, 10-11 cm. broad above the base, pinnate, with a terminal pinna similar to unequal lateral pinnae, but larger and broader than the upper ones, pinnae always opposite, 6-10 pairs, the upper ones 1-1½ cm. far apart, the lower 1½-2½ cm. far apart, sessile or very shortly petiolulate (petiolules channelled above, terete below, rosy-lilac on both sides, scarcely 1 mm. long, ½ mm. thick at base), subtruncate at base, ovate-oblong, (the largest ones 6 cm. long, 18 mm. broad above the base), gradually acuminate towards apex, pinnato-lobulate and always shortly caudate (cauda scarcely over 5 mm. long, 3 mm. broad at base, entire or undulate, obtusish), the lower pinnae auriculate at base, segments dilated at base, subfalcato- or suberecto-oblong or ovate, obtuse, obsolete mucronulate, subentire or margin obsoletely undulate, membraneous, subglaucous-green, with sublilac margin; largest segments scarcely over 1 cm. long, 4 mm. (at base) - 3½ mm. (at middle) broad. Segments in largest pinnae 16-18-paired. The costa of pinnae sulcate rosy-lilac or green above provided near the axil of lateral veinlets with subulu-

late often rosy-lilac spines 1½ mm. long, teret always rosy-lilac below, minutely puberulous when young. The mid-veins of segments rosy-lilac on the both side in the lower part, concolored on the upper manifescent below, much less so above, and often spinulose below the insertion of the laterl veinlets. The lateral veinlets minutely puberulous above when young concolored on both sides; mostly forked above the base or below the middle, the upper 1-2 lateral pairs simple; the lateral veinlets in the upper part of segments often sparsely provided at or below the point of branching with green or slightly rosy-lilac spinules but the middle veins destitute of spinules, the lateral veinlets in segment 10-16 paired. Sori undescribed.

Yunnan.

This species is characterised by stipes, rachis, veins of pinnae being shaded rosy-lilac, relatively closer pinnae, the entire quite short thin segments and the present presence of spines not only on the midrib of pinnae, the costa of segments, but also in or below the axils of lateral veinlet.

24. *Pteris quadriaurita* Retz. Obs. Bot. 6. 38, (1791); Matthew 390, (1911).

Pteris sulcata Link., 1846, [illegible]. 156.
Pteris repandula Link, Fil. Hort. Berol. 56, 1841.
Pteris subquinata Wall., 1828.
Pteris biaurita var. repandula Kuhn, Engl. Jahrb. 24. 99, 1897.

Stipes 30-60 cm. tall, strong, erect, naked or slightly scabrous, straw-colored or brownish; fronds 15-60-90 cm. long, 15-30 cm. or more broad with a terminal central pinna cut down nearly to the rachis into numerous close parallel linear-oblong lobes 1.2-2.5 cm. long, 4-6 mm. broad, the barren ones entire or slightly serrated and below this several similar pinnae on both sides, which are 15-30 cm. or more long and 2.5-5
(P. 262).
cm. broad, the lowest 2.5-5 cm. apart at the base, usually again compound with one~~s~~ or two similar but smaller pinnules, branching from them at the base on the lower side; texture subcoriaceous; rachis and both surfaces naked; veins conspicuous, usually once forked, 2-3 mm. apart at the base; sori often continuous along the whole margin of the segments.

Widely dispersed all over the world within the tropics and a little beyond them; Japan, Ceylon, Malays, Polynesia, India, China: Hupeh, Szechwan, Fukien, Kwantung, Hainan, Yunnan.

This species varies very much in size, cutting, etc.

25. Pteris Faurieri Hieron, Hedwigia 55. 345, (1914).

Pteris quadriaurita Christ, Herb. Bonapart. I, (1900). 69; Bull. Boiss. iv, 2. (1904).

Rhizome superficial, short, ascending, about 1 cm. across, densely scaly, scales subcordate, scarcely 1 mm. broad, subfalcato-deltoid-linear, 9 mm. long, gradually narrowed upward, very acute at apex, ferruginous in the middle, with a narrow pellucid-yellowish and denticulate-lacerate margin. Leaves to 80 cm. long; stipes to 45 cm. long, about 5 mm. across at base, compressed; trisulcate shining stramineous-green above, terete, stramineous-green or sordid below, the lower part clad sparsely with similar scales as on rhizome; rachis similar. Lamina broadly deltoid-ovate to 35 cm. broad at base, 25-35 cm. long, pinnate. Upper pinnae sessile, the lower subpetiolulate (petiolule winged), opposite, the upper ones about 1-2 cm. apart, the lower ones about 5-7 cm. apart, 5-8-paired with the terminal pinna similar to upper lateral ones but broader and slightly longer, deeply pinnatifid (the costal wing on both sides scarcely ½ mm. broader), subcuneate at base, oblong or linear-oblong, gradually acuminate above the middle, apex pinnatifido-lobulate or caudate (cauda 1-2½ cm. long. 3-4 broad at the middle, base pinnatifido-lobulate, margin undulate, subsuddenly decreasing towards apex; the lower pinnae broad, 1-2-auriculate on the lower side of the base; the lower auricled in the underside of the base sometimes ones more auriculate (these auricles pinnato-lobulate, about 3-4 cm. long, 1-1½ cm. broad at the middle); basal pinnae much the largest, 16-20 cm. long, 4-5 cm. broad below the middle, segments largest, 19-20 cm. long, 4-5-1 cm. broad below the middle, segments obscurely glauco-green, dilated at both sides of the base, falcato-linear or falcato-oblong-linear or the upper ones falcato-oblong and ovate, obtuse, entire or subundulate (margin subcallous, stramineous-green), when young, sparsely sericeo-puberulous and glandular, sinuses in sterile pinnae narrow, scarcely 1 mm. broad in the middle, the sinuses in fertile pinnae broader, suddenly widened above base also, about 2-3 mm. far apart in the middle the base of sinus humped with straw-green margin; the largest pinnules about 4 cm. long, 8 mm. broad at base, and 5 mm. (fertile) -6 mm. (fertile) broad in the middle; segments in largest pinnae about 25-32-jugated; costa of the pinnae shining, stramineous-green, terete below, channelled above, [illegible] below the insertion of the segments with subulate the middle veins of segments decurrent at base, obscurely channeled above, prominent, terete below, the upper of segments often undulate, [illegible] puberulous; lateral veinlets not prominent, subconcolorous, furcate, mostly ½-1½ mm. above the base or below the middle, lateral veinlets in largest segments 15-20-pair paired, sori marginal, borne on the lower part and often only on the upper part, about 1-2 mm. broad; indusium grey about ½ mm. broad, with subentire or undulate margin; [illegible] [illegible], compressed, obovate, about 0.25 mm. long

(P. 263).
9.15 mm. broad, shortly stipitate, paraphysis numerous, with a long articulate apical cell, spores subtriangular-tetrangular, dark colored glabrous, 0.05 mm. across.

Japan, Formosa, China: Among, Canton - Lou Fau Shan.

Var. rigida Hieron Hedwigia 55. 346, (1914).

Pteris quadriaurita Christ, 1900.

Differs from the type in pinnae being more rigid, clear glauco-green, midrib and lateral veinlets of segments thick and prominent on both sides. Pinnae 5-jugated, the lowest ones much the largest, 16½ cm. long, 3 cm. broad in the middle; segments in largest pinnae 26-28-jugated; the veins and lateral veinlets yellowish on both sides, veinlets in largest segments 16-18-jugated; scarcely over ½ mm. far apart.

Fukien.

26. Pteris tomentella Hand.-Mzt. in Sitzgsanz. Ak. Wien. 152, (1924); Symb. Sinic. VI. 41, (1929).

Rhizome long-creeping, about 2 mm. thick, densely fibrous-rooted, Stipes 2-3 mm. thick at the base, geniculate, erect, 1-1½ m. long, the upper side applanate, when dry, sulcate, brown as the rachis, which is brown-flavescent upward, fuscous-striate and densely furfuraceous tomentose, particularly on the lower side. Fronds pedately 7-sect, 85-100 cm. long, the lateral parts sessile or subsessile, the central ones subequal, the exterior ones gradually smaller, all pinnate; pinnae narrowly lanceolate, acute, the middle ones 15-20 cm. long, the anterior and the posterior ones subddenly decrescent, scarcely larger towards the apex, erecto-patent, subsessile, with subcontiguous margin, pinnatifid almost down to the rachis into 40 pairs of pinnules, pinnules herbaceous, quite green, glabrous, oblong, the fertile ones lanceolate, the lowest posterior ones slightly smaller than the anterior ones and more distant, slightly introrse, 4-4.5 mm. broad, shortly acute with obtusish apex, shallowly sinuate, the margin of the sterile segments crenato-dentate. Costules prominent above, and narrowly sulcate, lateral veins rigid, forming a single row of elongated areolae along the costules, the other parts dense, free and once forked. Sori very narrow, rarely produced towards the apex covered by the narrowly reflexed, submembranaceous, whitish or brownish margin.

Yunnan.

Closely allied to P. tripartita, differs by densely furfuraceous tomentose stipes and veins differently anastomosing.

27. Pteris biaurita L. Sp. 2. 1076, (1753); HKBK. 164; Matthew 388, (1911).

Campteria biaurita Hooker, 1849.

Pteris flava Goldem, 1843.
Litobrochia biaurita J. Sm., 1857.
Pteris nemoralis Willd., 1809.

Stipes short, erect. Fronds large, usually above 60 cm. long, pinnate, with numerous pinnae, the lowest often divided or again pinnate, all distinct, regularly and deeply pinnatifid; the segments numerous, oblong or lanceolate, more or less falcate and obtuse, the lowest often above 2.5 cm. long, the upper ones tappering to the end. Sori occupying the whole or the greater portion of the margin. Sterile segments scarcely broader.
(P. 364).

A common species in the topical regions of both the New and Old World: Japan, Malayas, Hongkong, China: Yunnan, Kwantung.

Differs from P. quadriaurita Retz. only in the costulae being united at the base by an arching vein.

Var. *parviloba* (Christ) C. Chr. Ind. Suppl. I. 67, (1912).

Pteris parviloba, Christ, Bull. Geogr. Bot. Man. 17. 149, (1906); Matthew 390, (1911).
Pteris quadriaurita Retz. var. parviloba Christ, Bull. Scien. Giard. 28, 264.

Differs from the type by thin texture, weak axillary pinnae ruddy color, and being verrucose.

Extending from Philippine, Tonkin, to China: Kweichow.

28. *Pteris geminata* Wall. List n. 2180, (1829); Ag. Rec. 31, (1839); Matthew 389, (1911).

Campteria geminata J. Sm., 1875.
Pteris maxima Baker, 1864, HKBK. 480.
Campteris anamallayensis Bedd., 1863.

Rachises stramineous, glabrous; fronds deltoid, all except lowest pinnae simply pinnatifid, the lowest with a stalk 2.5 cm. long, and 1-2 pinnatifid pinnules from lower side; pinnae reach 30 cm. lanceolate, falcate, 6-8 mm. broad at base, the barren toothed; texture rigidly coriaceous; surfaces naked, dark-green; veins fine, distinct, anastomosing in shallow costal arches.

India, Japan, Formosa, China: Szechwan.

29. *Pteris wallichiana* Agardh. Rec. 69, 1836; HKBK. 165; HK. Sp. 2. 206.

Lithobrochia wallichiana Fee, 1850-52.
Campteria wallichiana Moore, 1861.
Campteria pectinata Presl. 1836.

Stipes 1.5-2 m. long, strong, bright chestnut-brown, naked, glossy; frond tripartite with lateral divisions again forked, the central one often 60 cm. long, 30 cm. broad, with numerous lanceolate sessile opposite pinnules on each side, the largest of which are 15 cm. long, under 2.5 cm. broad, cut down within about 9-13 mm. long, 3 mm. broad, nearly entire when barren; lateral pinnae nearly as large as the terminal one texture herbaceous; rachis and both surfaces naked; veins not conspicuous, usually once forked near the base, 2 mm. apart; sori continuous along nearly the whole length of the edge.

India, China: Szechwan.

An Indian species recently discovered in China (cf. C. Chr. Medd. Göteb. Bot. Trädg. I. 98. (1924).

30. Pteris tripartita Sw. Schrad. Journ. 1800^2. 67, (1801); Matthew 390, (1911).

Litobrochia tripartita Presl., 1836.
Pteris marginata Bory., 1804, HKBK. 172; Christ 172; NPfl. 294.
Pteris pseudo-lonchitis Bory, 1810.
Litobrochia pseudo-lochitis Fee, 1850-52.
Pteris yunnanensis Christ, Bull. Boiss. 6: 957. 1898 NPfl. 294.

Stipes 30 cm. or more long, strong, erect, naked, polished, straw-coloured, or brownish; fronds tripartite, the central portion 60 cm. long or more; terminal pinna 15-23 cm. long, 1-2 mm. broad, cut down nearly to the rachis into numerous closely-placed linear lobes
(P. 265.):
on each side, which are very slightly toothed when barren; lateral pinnae very numerous, closely placed, all unbranched; lateral divisions similar to the central one, but smaller, sometimes forked again; rachis and both surfaces naked; texture usually herbaceous; veins free, anastomosing principally in rachis against the midrib; sori falling rather short of the apex of the segments.

Throughout the Asiatic Tropics, Polynesia, Malayas, Philippine, Ceylon, Formosa, China: Yunnan.

P. yunnanensis Christ is a robust form of the type.

48. Pteridium Gleditsch, Schopol, Flora Carneolica 169, (1760).

Type: Pteris aquilina L.

Sori in a continuous marginal line, arising from a transverse vein-like receptacle connecting the ends of the forked free veins. Inducium double, the outer conspicuous, formed by

by the reflexed membranous margin of the blade; the inner-obscure, delticate, borne upon the receptacle. Fronds triangular or deltoid-ovate, compound borne upon stout stipes, which scattered upon a slender freely branched woody creeping underground rootstock. A coarse herb ceous fern in open or partially shaded situation.

A genus of 6 or 8 closely related species of widest distribution, all of which are regarded by some botanists as mere forms of the typical aquilina.

Pteridium aquilinum (L.) Kuhn, v. Deck. Reisen. 3^3. Bot. 11, (1879); NPfl. 296; Matthew 388, (1911).

Pteris aquilina L., 1753, HKBK. 162; Christ 164.
Asplenium aquilinum Bernh., 1799.
Cincinalis arachnoides Klf., 1824.
Eupteris aquilina Newm., 1845.
Ornithopteris aquilina J. Sm., 1875.
Pteridium arachnoideum Maxon, Journ. Wash. Acad. Sci. 14. 89, 1924.

Rhizome stout, wide-creeping, subterraneous; stipes 30 cm. or more long, strong, erect, naked, straw-colored or pale-chestnut; fronds 2/3-2 m. or more long, 30-60 cm. broad; subdeltoid in general outline, only the uppermost pinnae simple, those next in order lanceolate, cut down nearly or quite to the rachis into short triangular or linear pinnules, the lowest long-stalked, 30 cm. or more long, with ample lanceolate pinnules which are cut down to the rachis into numerous lanceolate segments, which are again full pinnate; largest entire ultimate divisions 2.5 cm. long, 4 mm. broad; texture subcoriaceous; rachis and both surfaces naked of pubescent; veins close, conspicuous, often twice forked; inducium double or the inner one obsolete.

Dispersed all over the world in Tropics and N. and S. Temperate Zones, Africa, Europe, America, India, Japan, Formosa, Hongkong, Korea, China: Kwantung, Shensi, Shantung, Hupeh, Szechwan, Kiangsi, Chekiang, Anwhei, Kiangsu, Honan, Shansi, Manchuria, Chihli.

Var. caudatum (L.) HKBK. 173.
Pteris caudata L., 1733.
Allosorus caudatum Presl., 18~~5~~36. (P. 266).
Ornithopteris caudata J. Sm., 1875.
Pteridium caudata Maxon, Proc. U. S. Nat. Mus. 23, 631, 1901.

Pinnules sometimes linear and entire or with less crowded segments than in the type and the terminal lobes linear, entire 2.5-5 cm. long.

Manchuria.

Tribe VII Blechneae.

Sori oblong or linear, distant from the margin, parallel to the central ribs of the free or jointed ultimate segments. Inducium of the same shape, not marginal, attached at the outer side of the sorus opening inwardly. Stipes not articulate to the rhizome. Fronds dimorphous or conform, usually simply pinnate.

Key to Genera

1. Sori superficial
  2. Fronds alway uniform; veins anastomosing in distinct
    costal row of angular areolae. Inducium wanting ......
    ....49. Brainea
  2. Fronds always dimorphous; veins in the fertile and
    sterile frond anastomosing in a very indistinct
    costal row of extremely small linear areolae.
    Inducium wanting.................50. Stenochlaena
    3. Fronds uniform or dimorphous; veins of the sterile
      fronds free, those of the fertile ones united near
      the base by subcostal strands bearing the sori
      inducium linear;;;;..........51. Blechnum
1. Sori immersed in cavities, oblong, in 1-row on each side of
  the midrib of the ultimate segments; inducium present,
  of the same shape as the sori......52. Woodwardia

42. Brainea J. Smith, Cat. Kew Ferns, 5. 1856.
(Bowringia Hook.) (1853).

Type: Bowringia insignis HK.

Sori at first short and distinct, parallel to and near the midrib, at length usually confluent along the midrib and also produced along the veins in the direction of the edge of the frond, but not reaching the margin, and covering nearly the whole under surface of the fertile segments; inducium none. Fronds arranged in a crown, 1-pinnate, the venation as in Woodwardia, consisting a single row of areolas along each midrib with free simple veins extending to the margin of frond; caudes subarborescent; stipes not articulate to the caudex, (named in honor of C. J. Braine of Hongkong).

A genus limited to a single subarborescent species from India and China, resembling Blechung in general habit, but with naked sori and the veins forming a single row of costular areolae.

50. Stenochlaena J. Smith, Journ. Bot. 3. 401,
(1841), 4. 149, (1841).

Type: Acrostichum sorbifolium L.

Fronds distant, obliquely jointed to the rhizome mostly

dimorphic, the sterile ones simply pinnate, the pinnae articulate or not, narrowly elongated, entire or spinulose; veins spreading, simple
(P. 267).
or forked, arising directly from the costa or from a subcontinuous transverse costal obscure veinlet; fertile fronds pinnate or bipinnate, the pinnae contracted, completely sporangiferous beneath, nonindusiate, the margin often thin and narrowly recurved. Stipes adherent to the rhizomes. Epiphytic ferns of shady situation, rhizomes elongated, woody, scandent, conspicuously paleaceous and unarmed, or nearly naked and sparsely aculeate. (Greek, "Steno", narrow; chlaena, cloak, referring to the narrow indusiform margin).

Species about 40 mainly in tropics of both hemispheres, 3 recorded in China.

Key to species

1. Rhizome naked..............................1. S. palustre
1. Rhizome clad in large lanceolate subulate membranaceous
    2. Pinnae articulate to the rachis..:.....2. S. sorbifolia
    2. Pinnae not articulate to the rachis...3. S. henryi

1. Stenochlaena palustris (Burm.) Bedd. Handb. Suppl. 26, (1876); NPfl. 251.

Polypodium palustris Burm., Fl. Ind. 234, 1768.
Lomariopsis palustris Kuhn, 1869; Christ 41.
Acrostichum palustris Clarke, 1880.
Acrostichum scandens HK., HKBK. 412.
Stenochlaena scandens J. Sm., 1841.
Onoclea scandens Sw., 1800.

Rhizomes woody, wide-scandent, scaleless; stipes 7.5-10 cm. long, firm, erect, naked; fronds30-90 cm. long, 1.8-3.7 cm. broad alternate or opposite, lanceolate, acuminate, the edge thickened and pungently serrate towards the apex, the base cuneate, sessile or slightly stalked, articulated and with usually a gland on the upper side; texture coriaceous; rachis and both sides naked; veins fine and close simple or forked, generally free to the thickened edge; rarely the forke or two separate veins anastomose in the middle of, of towards the margin of the pinnae; fertile pinnae very much contracted 15-30 cm. long, 3-4 mm. broad, the lower ones 2.5-3.7 cm. apart.

Himalayas, Ceylon, Queensland, Fiji, China: Hainan.

A high-climbing fern, often reaching the tops of trees in tropical forests.

2. Stenochlaena sorbifolia (L.) J. Sm., JoB. 4. 149, (1841); NPfl. 251; Matthew 391, (1911).

Acrostichum sorbifolium L., 1069, HKBK. 412.
Lomaria sorbifolia Klf., 1824.
Lomariopsis sorbifolia Fee, 1845; Christ 39.
Chrysodium sorbifolium Luerss., 1871.
Polybotrya sorbifolia Keys, 1873.

Rhizomes thick, woody, often 10-15 m. long, clasping tree like a cable, sometimes prickled paleae subulate, large; fronds 30-45 cm. long, 15-30 cm. broad, simple pinnate; barren pinnae 10-20 cm. long, 1.8-1.2 cm. broad, 3-20 on each side, articulated at the base, the edge entire or toothed; texture coriaceous or subcoriaceous; both sides naked; rachis often winged; fertile pinnae smaller, much contracted, 2.5-5 cm. apart, 5-10 cm. long, 6-10 mm. broad.

Widely diffused throughout tropical Asia, Cochin-China Philippines Malaya, Formosa, China: Hainan, Yunnan. (P. 268).

A very variable species, with more than 15 closed related species described by different botanist from time to time, some of which may be regarded as varieties whiel the others as mere forms of the type.

3. Stenochlaena henryi Christ, Not. Syst. I. 48, (1909).

Rhizomes.....? Stipes incrassate and as thick as man's finger as base, the upper part thick as swan's quill, clad sparcely in lanceolate, pale brown, flaccid, opaque, ciliate scales and like rachis furfuraceous, rufo-stramineous, hard, 10 cm. long; fronds 80 cm. long, 4- cm. broad, pinnate base not narrowed, pinnae about 18 on each side, patent, about 3 cm. apart, the lower ones shortly petiolate, sub-cuneate at base, calous at the point of insertion, not articulate, the upper ones sessile, truncate on the posterior base, the uppermost ones narrowly adnate not decurrent, acuminate caudate, lanceolate, 19 cm. long, 22 mm. broad; both the terminal and lateral pinnae are similar, costa conspicuous, rufo-stramineous; veins conspicaeous, ver numerous, 1 mm. apart, patent, mostly forked, from base, extending to the teeth, margin regularly and very narrowly denticulate, apex coarsely serrate; the fertile fronds as large as the sterile pinnae more distant, sessile, 22 cm. long, 5 mm. broad, the lower ones with cuneate base, the upper ones having adnate and cordate base, apex acuminate, margin subentire; sporangia borne all over the lower surface, except costa, brown-ochraceous; texture hergaceous, color light green, both surfaces glabrous and opaque.

Yunnan.

A quite distinct species on account of its serrulate pinnules, with finely elongate and strongly serrated apex and also of its very long and sessile fertile pinnae, all of which combined tend to make this species uncomparable with any of the known asiatic ones as enumerated by Underwood (in Bull.

Toorrey Bot. Club. XXXIII 36, 1906).

51. Blechnum Linne, Sp. Plant, 2. 1077, (1753).
Type: Blechnum occidentale (and
oriéntale) L.

Sori linear forming two continuous lines or nearly so, parallel with and usually contiguous to or between the midrib and margin; inducium membranaceous, longitudinal, distinct from the edge of frond, or slightly damorphic; generally pinnate or pinnatifid, very rarely simple or bipinnate, veins simple or forked, free, rarely anastomosing. Usually large coarse ferns with creeping rootstock andclustered stout stipes, scaly at base; texture thick coriaceous; sori often borne on the upper pinnae or pinnules.

A genus of about 157 species, chiefly in tropical and subtropical countries of both hemispheres, 5 known in China.

Key to species.

1. Fronds uniform
   2. Rhizome creeping, the cuticle on the under surface of the frond loose and wrinkled..............1. B. melanopus
   2. Rhizome erect, the cuticle on the under surface of the frond not loose and wrinkled..2. B. orientalis
1. Fronds dimorphous
   2. Sterile frond of herbaceous texture, pinnae 3-4 cm. long when
(P. 269).
fully grown.............................3. B. spicant
   2. Sterile frond of rigid coriaceous texture, pinnae below 2.5 cm. long.
      3. Sterile frond stipitate (stipes to 4 cm. long); pinnae remote; fertile pinnae inflated.......................................4. B. eburneum
      3. Sterile frond sessile, pinnae closely pectinate, fertile pinnae not inflated.......5. B. hancockii

1. Blechnum melanopus Hooker Sp. 3. 64 t. 161, (1860); HKBK. 186; Christ 183; NPfl. 247; Hand.-Mzt. Symb. Sinic. 34, (1929).

Blechnidium melanopus Moore, Ind. CLV. 1860.

Rhizome creeping, 3-4 mm. thick with fronds 0.5-2 cm. apart; pluriarticulate, to 6 mm. long, 1.5 mm. broad, sparsely denticulate, obscure brown, shining, darker colored at the base paleae dense, black, patently or broadly lanceolate, gradually acuminate and subulate. Stipes erect, 15 cm. long, naked, dark chestnut-brown; frond ovate-lanceolate, 20-23 cm. long, 7.5 cm. broad, with numerous contiguous linear falcate pinnae on each side, which are 2.5-3.7 cm. long, 6-10 mm. broad, narrowed gradually towards the point, the edge entire, the upper ones adnate and dilated at the base, but those below

the centre distinct, the lowest ones growing gradually shorter and blunder; texture coriaceous, rachis and both surfaces naked; veins forming large arched areolae; sori in a continuous line near the midrib.

India, China: Yunnan.

Most like some of the forms of B. orientale in habit, differs by the cuticle of the under side of the frond loose and wrinkled and, particular-ly by the creeping rhizome. Differs from Hooker's type by not all veins anastomosing but some sun out in free forkings.

2. Blechnum orientale Linn, Sp. 2. 1077, ed. II. 2. 1535, (1763); HKbK. 186; Christ 182; NPfl. 247; Matthew 351, (1911).

Asplenium orientale Bernh., 1802.
Blecnum longifolium Cav., 1802.
Blechnopsis orientale Presl., 1849.

Stems short, thick, erect or ascending. Fronds pinnate 30-90 cm. long or much longer with narrow glossy scales at the base of the stipes, pinnae numerous, sessile, linear lanceolate, entire, mostly 15- 23 cm. long or sometimes near 30 cm. long; the lower pairs suddenly abbreviated or reduced to small scales; veins closely parallel or ~~f~~ usually simple. Sori close to the midrib, also concealing it when mature.

Abundant in India, Ceylon, Malayan Archipelago, Pacific Islands, Formosa, Loochoo, Hongkong, China: Shensi, Kwantung, Hainan, Fukien, Chekiang, Yunnan, Kweichow, Kwangsi.

A very common plant in warmer part of China, very variable in size, in wooded ravines it may attain a height of 2 m, with pinnae over 30 cm. long, when growing in exposed places it is much lower.

3. Blechnum (L.) spicant Wither, Bot. Arr. ed. III. 785, (1796); HKbK. 178; Christ 179; NPfl. 249; Matthew 351, (1911).

Osmunda-spicant L., Sp. 2. 1055, 1753.
Struthiopteris spicant Weis., 1770.
Acrostichum spicant Willd., 1787.
Onoclea spicant Hoffm., 1795.
Asplenium spicant Bernth. 1799.
Lomaria spicant Desv., 1801.
Lomaria crenata Presl., 1825. (P. 270).
Lomaria niponica Kze., 1848.

Rhizomes stout, short-creeping; barren fronds on stalks 5-7.5 cm long, lanceolate, 15-23 cm. long, 2.5-3.5 cm. broad, narrowed gradually below; pinnae linear, 1.3-1.8 cm. long, 3 mm. broad, bluntish or mucronate slightly dilated at the base; texture herbaceous; veins inconspicuous; fertile fronds often 30 cm. long, 5 cm. broad, on stems 15-23 cm. long, chestnut-coloured

and polished; narrowly linear, pinnae 6-10 mm. apart, dilated at the base, the line of fructification at first slightly intramarginal.

Europe, America, Japan, China: Hupeh - Ichang; Szechwan Omei Shan.

According to Christensen the species is not found in W. China. Its record from that region may a mistake for B. eburneum Christ.

4. Blechnum eburneum Christ in Bull. Geogr. Bot. Mans. (1902) 233 c. fig.; C. Chr. Ind. 153 (1906); Matthew in Journ. Linn. Soc. 36; 351 (1911).

Rhizome rather long, 4 mm. thick, oblique, clothed with dark brown, lanceolate subulate scales ½ cm. long, entirely glabrous in other parts; stipes fasciculate, those of the sterile fronds 48 cm. long those of the fertile somewhat longer, rigid, thick as raven's quill, reddish-stramineous; the sterile frond 20-30 cm. long, 2.5-4 cm. broad, elongate lanceolate, acuminate, gradually attenuate towards the base, pinnate; rachis quite distinctly sulcate above, teret underneath; pinnae 30-58 on each side, the lower ones strongly reduced into auricles the upper ones closely pectinato-patent with very narrow acute sinuses, linear-lanceolate, falcate, broadly adnate but not decurrent and dillted on the upper side at the base, 1.8-2.5 cm. long, 4 mm. broad, very entire and acute, toughly coriaceous, whitish below and pale green above, margin strongly reflexed, provided at the point of insertion with the rachis with a dark brown deciduous linear scael; veins hidden completely; fertile frond as long as or slightly longer than the sterile, strongly attenuate towards the base, pinnate, pinnae numerous, remote, the lower ones about 1 cm. apart and much closer upwards; adnate, but contracted above the base with round broad sinuses, linear, pod-like, apiculate, 1½ cm. long, 2 mm. broad, plane above, inflated below; indusium persistent, shining green, convex, covering the entire sorus.

Szechwan, Hupeh, Kweichow.

To characterize this very distinct species, it deems fit Christ's statement, Espace tree particulière parson tissu coriace, sacouleur claire, ses pinnae fertiles enflees par des spores cylindrique a indusia persistent". This unique fern was first collected by Pere J. Bodinier, Nov. 4. 1897, in the vicinity of Kweiyang, Kweichow, on rocks by the stream, and about similtaneously by Rev. E. Faber in Omei Shan, S. Szechwan, the latter specimen was identified by Baker at Kew as B. spicant (L.) Wither. It is most likely as Dr. Christensen remarked that all B. spicant reported from W. China by earlier collectors is B. eburneum Christ.

5. Blechnum hancockii Hance, JoB. 267, (1883).

Lomaria apodophylla Baker, JoB. 104 1885; Matthew 351, 1911.

Basal scales dense, dark-brown, large, linear, firm in texture. Fronds tufted, sessile, the sterile ones oblanceolate-oblong, rather thick in texture, 15-26 cm. long, 3.3-5 cm. broad, simple pinnate, gradually narrowed towards the base, green and glabrous on both surfaces;
(P. 271).
pinnae about 25 on each side, lanceolate, subobtuse, curving upward, contiguous, adnate by a dilated base, entire, the central ones about 2.5 cm. long, 4 mm. broad; veins quite hidden; fertile pinnae remote, linear, ascending, the middle ones 1.6-2.5 cm. long, 2 mm. broad, indusium broad, firm, glabrous.

Allied to Blechnum spicant (L.) and Chilian B. aspera Klotzsch.

Tamsin, Formosa, Hongkong, S. China.

52. Woodwardia Smith Mem. Acad. Turin. 5. 411, (1781).

Type: Blechnum radicans L.

Sori oblong or linear-oblong, sunk in cavities, arranged in one or more chain-like rows on transverse anastomosing veinlets, parallel with and contiguous to the midribs of the pinnae and pinnules; indusium subcoriaceous of the same shape as the sorus, fixed by its outer margin to the soriferous veinlets, free and open on the side next to the midrib closing over the cavity like a lid. Veins always springing from a row of costal arches, for the rest free or forming one or more series of hexagonal oblique areolae, but always free toward the margin of frond. Fronds ample, usually uniform or somewhat dimorphic, oblong-ovate pinnatifid or bi-pinnatifid; texture thick, coarse; the stipes scaly at the base. Rhizomes thick, stout, creeping extensively underground and sending up fronds at intervals. (Named in honor of Thomas Woodward, an English botanist).

A small genus of about 8 species, widely dispersed over the North Temperate Zones, more rarely penetrating into the Tropics; 3 are known in China.

This genus is distinguished from its allies by its oblong or oblong-linear sori placed end to end, resembling the links in a chain, and parallel to the midrib of pinnae or pinnules. In this respect, it differs from Asplenium in which sori are oblique to the midvein.

Key to species.

I. Fronds simply pinnatifid....................1. W. harlandii
II. Fronds bipinnatifid.
  A. Pinnae cut down nearly to the rachis..2. W. orientalis

b. Pinnae cut ½ or 2/3 down to the rachis..3. W. japonica

1. Woodwardia harlandii Hooker, Fil. Exot. t. 7, (1857); HKBK. 187; Matthew 392, (1911).

Lorinseria harlandii J. Sm., 1875.
Woodwardia kempii Copel., Phil. Journ. Sci. Bot. iii. 280, 1908.

Rhizomes creeping, rather stout, shagy with narrow, subulate, brown scales; stipes generally much longer (20-30 cm.) than the frond, moderately stout, pale greenish-brown, dark chestnut at the base and there bearing a few scattered narrow subulate scales. Fronds broad ovate or subrhomboidal, texture coriaceous, glabrous, more or less dimorphic; the fertile fronds 15-30 cm. long, deeply pinnatifid (sub-pinnate below) into 5-7 elongato-lanceolate distant spreading segments, 10-18 cm. long or more, 8 mm. or nearly 2 cm. broad in the widest part, acuminate, margin subentire below and finely serrulate towards the apex, rarely sinuato-lobed; veins moderately conspicuous, anastomosing from a single row of elongated costal-arches into 2-4 rows of hexagonal oblique areolae; sori close to the main costa and parallel with it each
(P. 272).
side, sometimes branching off at nearly right angles, oblong or linear oblong, occasionally confluent and continuous, indusium of the same shape and size, opening towards the costa. Sterile fronds borne on shorter stipes, often palmately lobed into 3-5 lanceolate segments or sometimes simple, segments much broader than the fertile ones and finely serrulated above the middle.

Hongkong: Tai-mo Shan, Kwantung: Phoenix mountain, Swatow.

A very distinct species, characterized by dimorphic fronds, pinnatifid deeply down to the rachis into a few elongate-lanceolate spreading segments. So far not known elsewhere in China.

Woodwardia kempii Copel is only an anomalous form, the segments of which show the tendency of being again pinnatifid.

2. Woodwardia japonica (L. fil.) Sm. Mem. Acad. Turin. 5. 411, (1793); HKBK. 188; Matthew 392, (1911).

Blechnum japonicum L. fil., Suppl. 445, 1781.
Woodwardia virginica Christ, Farnk. Erde 186 (pt.).

Rhizomes creeping, with copious linear-lanceolate acuminate scales; stipes 16-30 cm. long erect, scale below. Fronds broad ovate to oblong ovate 30-60 cm. long, 20-40 cm. broad high, pinnate. Pinnae about 6-8 pairs, all distinct, or the upper

pair confluent with the terminal one, lanceolate, often 15 cm. long, 2.5-3 cm. broad, pinnatifid with short obtuse lobes, 6-10 mm. broad, which reach half or two-thirds of the distance down to the rachis all ending in a lanceolate entire point. Veins reticulate with a principal vein corresponding to each lobe. Sori linear, distinct or confluent along the midrib of each lobe, more rarely along the midrib of the pinnae, and only in its upper portion. Barren fronds smaller with fewer and broader pinnae than the fertile ones.

Japan, Hongkong, China: Kwantung, Szechwan, Hupeh, Yunnan, Chekiang Kiangsu, Kiangsi.

Common in woods or shaded places.

3. Woodwardia radicans (L.) Sm. Mem. Acad. Turin. 5. 412, (1793); HKBK. 188; Christ 186; NPfl. 253; Matthew 392, (1911).

Blechnum radicans L., Mant. 307, 1771.
Woodwardia auriculata Bl., 1828.
Woodwardia prolifera HK. et Arn., 1836-40.
Woodwardia angustibloba Hance, 1868.
Woodwardia orientalis Sw., 1801; HKBK. 188.

Stipes strong, erect, naked, clad at the base with large lanceolate acuminate paleaceous scales; fronds ample, 1-2 m. long, 30-45 cm. broad, pinnate, subcoriaceous; pinnae lanceolate, the lower ones often 30 cm. long or more, cut down below within a short distance of the rachis into finely - toothed lanceolate acuminate, subfalcate pinnule, 2.5-30 cm. long, those of the under side the shortest; veins anastomosing once outside the line of sori, thence free to the margin; sori parallel with and near to the costule, short oblong, sunk in cavities, which have an elevated margin; gemmae few and large, placed at the base of the upper pinnae.

Europe, America, N. India, Java, Formosa, China: Yunnan, Szechwan, Kwantung, Fukien, Shensi.

Tribe VIII. Asplenieae

Sori oblong or linear, straight or more or less recurved, rarely horseshoe-shaped, springing from the sides of veins like the indusia, mostly oblique to the costa, rarely placed between the veins. Indusium of the same shape, opening towards the costa or sometimes towards the margin, if double towards opposite directions, if connivent towards one another. Stipes not articulate to the rhizome. Segments often acroscopically auriculate.

Key to Genera

1. Stipes with 2 distinct more or less flattened vascular strands, mostly uniting towards the apex into a single peripheral semicylindrical diarchous one. Rhizome

scales of thin-walled cells finely cancellate, the areolas mostly dark-coloured.

2. Inducium free on one side.

3. Sori and inducium mostly short, often curved, sometimes hamate or horseshoe-shaped. The higher ones never, the lower ones rarely diplazioid.........................53. Athyrium

3. Sori and inducium mostly long and straight; the lower sori and the inducia of the same group of veins often, the higher ones rarely double, i.e. 2 opposite sori and inducia to a single vein.................................54. Diplazium

2. Inducium attached on all sides, sausage-shaped, at last bursting down from the middle irregularly.................................55. Diplaziopsis

1. Stipes with 2 or 1 more concave vascular strands mostly uniting towards the apex into a single central tri-tetrarchous one. Rhizome scales of thick-walled cells, coarsely cancellate, the areolae mostly decoloured.

2. Sori in opposite pairs, inducia opening towards one another.

3. Sori linear, regular. Veins free or anastomosing towards margin. Fronds not rooting at apex.......................................56. Phyllitis

3. Sori short, oblong, irregularly disposed, veins reticulated near the base. Fronds elongated and rooting at apex..................57. Champtosorus

2. Sori not in opposite pairs; inducia obliquely opening towards the costa.............58. Asplenium

53. Athyrium Roth. Rom. Mag. 2^1. 105, (1799); Tent. Fl. Germ. 3, 58, (1800).

Type: Polypodium filix-foemina L.

Sori usually curved, oblong to linear-oblong, or crossing the veins and recurved; sometimes unequally hippocrepiform, rarely roundish; inducium shaped like the sorus, attached as in Asplenium, subentire to fimbriate, rarely vestigial and concealed. Fronds tall, strictly herbaceous usually clustered simple, pinnate to tripinnatifid with free veins; the stipes green or greenish, succulent herbaceous not filiform, not jointed to the rootstock the bundles concentric and uniting above into 2 3-4 armed central bundle; scales delicate, of thin-walled cells. (Greek, "shieldless", of a doubtful application).

Atout 140 species in the warmer parts of both hemispheres; 45 are know in China.

A genus closely allied to Asplenium in habit, from which it

(P. 274).

differs by having some of the sori curved crossing the subtending veinlet or occupying both sides of it, by having in the base of stipe two vascular bundles which unite above to

form a peripheral horseshoe-shaped one and by having paleae with thin lateral walls and pigments in the lumen.

Key to species.

1. Frond simply pinnate, pinnae from subentire to pinnatifid a very narrow wing along the costae.
2. Lower pinnae more or less reduced.
3. Lowest pinnae reduced to free auricles.
4. Pinnae about 40 on each side, scarcely over 1 cm. broad; lobes crenulate.....1 *A. dolosum*
4. Pinnae about 20 on each side, above 2 cm. broad; lobes biserrate..........2 *A. biserrulatum*
3. Lowest pinnae not reduced to auricles but much longer than broader.
4. Texture hardish or rigidly subcoriaceous.
5. Stipes below 4 cm. long; crenus bifid.......................................3. *A. davidii*
5. Stipes much long; teeth not bifid.
6. Basal paleae usually black; sori ellongated, straight..............4. *A. silvaticum*
6. Basal paleae usually brown; sori usually horseshoe-shaped.
7. Fronds above 35 cm. long, 5 cm. broad.........................5. *A. nephrodioides*
7. Fronds usually below 15 cm. long and much narrower.........6. *A. fallaciosum*
4. Texture thin herbaceous or membranaceous.
5. Fronds to 7 cm. broad, sori not horseshoe-shaped.........................7. *A. sargentii*
5. Fronds over 15 cm. broad; sori usually horseshoe-shaped.
6. Stipes and rachis dark-purple...8. *A. wilsonii*
6. Stipes straw-colored at best, rachis pale=green.
7. Sori large, irregular, all strongly horseshoe-shaped indusium persistent.........................9. *A. macrocarpum*
7. Sori small, regular, only the lower ones horseshoe-shaped, indusium fugaceous................10. *A. filix-foemina*
2. Lower pinnae not or scarcely reduced.
3. Texture subcoriaceous, rigid.
4. Segments entire or subentire.
5. Segment unequal at base, margin reflexed upward..........................11. *A. muticum*
5. Segment equal at base, margin plane...................................12. *A. subsimile*
4. Segments distinct serrate or pinnatifid.
5. Frond triangular, 15 cm. long and as broad...................................13. *A. goeringianum*
5. Frond lanceolate, above 30 cm. long.......................................14. *A. drepanopterum*

3. Texture thin herbaceous or membranaceous.
4. Pinnae distinctly petiolate.
5. Stipes and rachis violate-colored; frond
almost equalateral triangular..............
..............................15. A. violescens
5. Stipes obtherwise colored, frond usually
longer than broad.
(P. 275). 6. Pinnae to 4 cm. long, 1 cm. broad........
...........................16. A. woodsioides
6. Pinnae above 10 cm. long, 2 cm. broad.
7. Sori a linear in regular rows close
to the midrib.
8. Segments only slightly crenate......
...................17. A. wardii
8. Segments broadly lobed about half way
down...............18. A. nigri~~b~~pes
7. Sori subrounded, medial.
8. Pinnae with petioles to 10 mm. long.
.................19. A. monticola
8. Pinnae with petioles below 5 mm.
long.............20. A. unifurcatum
4. Pinnae sessile or subsessile.
5. Segments entire, equal at base; sori numerous,
in long regular rows close to the costa....
..............................21. A. acrostichoides
5. Segment serrate, unequal at base, sori scattered
or fewer if in rows.
6. Sori elongated or decidedly horse-shoe-shaped.
7. Main and partial rachis scaly-villoss.........
........................22. A. macdonellii

8. Rachis glabrous.
9. Stipes and rachis often tinged
purplish when dried....................
...............23. A. niponicum
9. Stipes and rachis not so when dried....
.................24. A. henryi
6. Sori round or oblong or reniform or elongate,
rarely horse-shoe-shaped.
7. Sori large, 1.5 mm. broad...................
.......................25. A. Pachysorum
7. Sori smaller.
8. Sori costal.
9. Base~~s~~ of pinnae broadened...............
.................26. A. petiolosum
9. Base of pinnae not broadened...........
.................27. A. yokoscense
8. Sori marginal or medial.
9. Pinnae cut 2/3 way down...............
..................28. A. fasciculatum
9. Pinnae down to rachis...................
................29. A. mupinense
1. Fronds bipinnate
2. The lower pinnae more or less shortened.
3. Pinnae and pinnules conferto-imbricate with the
anterior basal pinnules imbricating on the main

3. Pinnae and pinnules conferto-imbricate with the
anterior basal pinnules imbricating on the
main rachis.
4. Scales on the rhizome black; sori oval, 6-8
to a pinnule...............30. A. delavayi
5. Pinnae and pinnules distant, the anterior
basal pinnules not imbricating on the
main rachis..............31. A. mairei
2. The lower pinnae usually longer than the ones
next above or at best not shortened.
3. Fronds usually narrowly deltoid-oblong, under
15 cm. broad.
4. Fronds exceeding proliferous under the apex,
to 60 cm. long..............33. A. viviparum
4. Fronds not proliferous at apex, usually to 30
cm. long.
5. Sori adpressedly costular.
6. Rachis rosy-luctuous; sori large, slightly curved, dark brown...................
.....................34. A. roseum
6. Rachis pale; sori smaller, almost
straight, gray......35. A. sinense
5. Sori not costular.
6. Sori strongly horseshoe-shaped.
7. Sori dense, large, 1½-2 mm. long,
indusium persistent..................
....................36. A. anisopterum
7. Sori sparse, much smaller, indusium
fugaceous........37. A. veitchii
6. Sori not horseshoe-shaped.
7. Sori lanceolate; stipes to 15 cm.
long shorter than frond...............
...................38. A. imbricatum
7. Sori rounded; stipes to 30 cm. long,
longer than frond.....................
..................39. A. longipes
3. Fronds usually broadly deltoid, over 25 cm. broad.
4. Lateral pinnae under 15 cm. long.
5. The rachis of pinnae narrowly winged; sori
almost costular...............40. A. vividifronds
5. The rachis of pinnae wingless; sori medial........
...........................41. A. pseudo-setigeru
4. Lateral pinnae above 25 cm. long.
5. Pinnules petiolate (petiole 1½ cm. long).
6. Segments remote, inciso-lobed; sori costular.....
..........................42. A. multifidum
6. Segments pectinately close, crenulate,
extending from costule to the margin...........
..........................43. A. yunnanense
5. Pinnules sessile or nearly so.
6. Segment elliptical-rhomboid, deeply inciso-crenate.....................44. A. umbrosum
6. Segments oblong, crenate...45. A. alatum
1. Frond copiously 3-pinnate.

2. Sori reniform, inducium cystopteroid...46. A. atkinsoni
2. Sori rounded or oblong, inducium not cystopteroid.
  3. Fronds pubescent on both sides......47. A. crenatum
  3. Fronds glabrous.
    4. Frond decided equilateral triangular..............
    ....48. A. spinulosum
    4. Frond elongate triangular.
      5. Sori exinduciate.
        6. Sori mostly solitary.......49. A. sphaeropteroides
        6. Sori densely crowded on the segment..........
        ....50. A. fargesii
      5. Sori induciate.
        6. Inducia irregularly lacerate................
        ....51. A. cavalerianum
        6. Inducia with entire margin.
          7. Segments oblong-rhomboidal, mucronate, adnate.................48. A. spinulosum
          7. Segments subdeltoid, deeply inciso-serrate, distinctly stalked............
          ....52. A. fimbriatum

1. Athyrium dolosum Christ, Bull. Geogr. Bot. Man. (1907). 136; Matthew 348, (1911).

Rhizomes elongate, erect; stipes thick (5 mm. and more thick), pale stramineous, clothed with sparing setules, 30 cm. long, fronds much larger elongate and narrower than the Athyrium acrostichoides (Sw.), narrowly lanceolate, acuminate, 90 cm. long, 30 cm. broad, gradually narrowed towards base; pinnae numerous, about 40 on each side, reduced into free auricules towards base, patent, 7 cm. long, scarcely 1 cm.
(P. 277).
broad, base broad, sessile, the lower ones remote, the upper close, acute, not cut down to the costa, lobes rather obtuse, the upper ones acute, 3-4 mm. long, 2 mm. long, ovate-triangular, acutely crenulate; veins oblique, 5 on each side; sori short, ovate-rounded, 3 on each side (free at the apices of lobes), scarcely over 1 mm. long and broad, indusium reniform, broad, ochraceous, persistent but soon corrugated, light brown, almost asplenioid.

2. Athyrium biserrulatum Christ, Bull. Geogr. Bot. Man. 135, (1907) Matthew 348, (1911).

Rhizomes horizontally long-creeping, thick as goose's quill, densely radicose, brown; stipes few or solitary with castaneous base clothed in ovate-acuminate brown scales, the upper parts stramineous and like other parts very glabrous; slender, 25 cm. or more long. Fronds 30-40 cm. long, 11-20 broad, ovato-acuminate, towards base attenuate, the basal ones reduced to free auricles; pinnae 7 cm. long, 2 cm. broad, quite remote, subsessile or very shortly petiolate, patent, falcate, the lower ones opposite, about 15 on each side under the pinnatisect apex, cut down to a narrow wing

into pinnules, which are about 12 on each side under the caudate apex, close, broadly adnate, oblong, 1-cm. long, ½ cm. broad, obtuse, almost unequally i. e. upper side of the base moderately auriculated, biserrate, i. e. the ovate lobato-dentate lobes distinctly serrate, teeth aristate, veins in lobes pinnato-furcated; sori about 4 on each side, close to costules, small, 1 or 1- mm. long, rotundo-ovate, curved, indusium curved, gray, persistent; texture thinly herbaceous, color flavescent-green.

Yunnan.

3. Athyrium davidi (Franch.) Christ, Bull. Soc. Fr. 52. mem. 1, 50, (1905).

Polypodium davidii Franch., Pl. David. II. 157, 1887.
Phegopteris davidii Bedd., 1892.

Ferns 20-30 cm. tall, rhizomes? Stipes grooved longitudinally, very short, about 2.5 cm. long, scales brown, ovate-lanceolate. Fronds subcoriaceous, intense green, opaque, lanceolate, reduced below, bipinnatifid, rachis sparingly paleaceous, paleae minute; pinnae close, lanceolate, base never broader, spreading and slightly-ascending, sessile, the lowest ones only 7-10 cm. long, pinnules with a very narrowed base which are confluent, ovate, apex rounded, inciso-crenate, crenus often bifid; sori ovate or rounded, 4-8 to each pinnule, between costa and margin, medial; veins pinnate, free tertial veins furcated.

Yunnan, Szechwan.

Perhaps identical with A. alpstre from Europe.

4. Athyrium silvaticum (Bl.) Milde, Bot. Zeit. 376, (1866).

Allantodia silvatica Bl., 1857.
Asplenium silvaticum Baker, 1867, [illegible]. 229.
Athyrium basilare Fee, 1850-52.

Rhizomes slender and creeping. Fronds 22-60 cm. long, always simple pinnate, the young stipes and rachis bearing a few pale brown scales; pinnae in the large specimens attaining 15 cm. long diminishing gradually to the pinnatifid apex, and the lower rather shorter, all lanceolate, deeply pinnatifid, with a broad usually truncate base; the lobes numerous oblong or ovate, obtuse or almost acute, serrulate or entire; veins pinnate in each lobe, with 4-8 branches on each side not anastomosing with adjoining ones; sori usually on all the veins and thus regularly pinnate as in Diplazium esculentum, simple or the lower ones double.

Loochoo, Malayas, Corea, Hongkong, China.

5. Athyrium nephrodioides (Baker) Christ, Bull. Soc. Fr. 52. Mem. 1. 47, (1905); Matthew 349, (1911).

Asplenium nephrodioides Baker, JoB. 170, 1887.

Caudex erect, stipes densely tufted, stramineous above the base; 15-30 cm. long, densely paleaceous towards the base; palese firm in texture, lanceolate, brown, castaceous. Lamina lanceolate, bipinnate, 30-45 cm. long, 5-7.5 cm. broad at the middle; narrowed gradually from the middle to both ends, rather rigid in texture, green and glabrous above, slightly mealy beneath; pinnae very numerous, lanceolate, sessile, the central ones much the largest, ascending, 5-7.5 cm. long, 0.5-1.3 cm. broad cut down to a narrow wing into oblong deeply-toothed secondary segments 1.55-2 mm. broad; veins copiously pinnate in the secondary segments; veinlets erecto-patent; sori oblong, filling up the whole under surface of the pinnules; indusium glabrous, persistent, variable in shape, sometimes curved and almost nephrodioid.

China: Hupeh - Patung.

6. Athyrium fallaciosum Milde, Fil. Europ. 54, (1867); Matthew 348, (1911).

Asplenium mongolicum Franch., Nouv. Arch. Mus. II. 7. 161. 1883.
Athyrium mongolicum Diels, NPfl. 224, 1899.
Athyrium fauriei Christ Mak., Bot. Mag. Tokyo, 17, 166, (1904).
Nephrodium fauriei Christ, Bull Boiss. 4. 671, (1896).
Aspidium fauriei Christ, 1898.
Athyrium nikkoense Mak., 1903.

Caudex short, erect or ascending, very thickly covered with the basal remains of the stipes from previous growth, densely rooting below, stipes caespitose, much shorter than the frond, pale when dried, but dark brownish and densely clothed with scales towards the base about 1-14 cm. long; scales lanceolate to linear, acuminate, entire, membraneous, ferrugineous-rugous, often castaneous towards the centr, about 10 mm. long, venules very delicate forming many longitudinal areolae. Fronds simply pinnate, narrowly lanceolate, acuminate, narrowed below, 8-40 cm. long; 2½-9 cm. broad, often rather firmly herbaceous, glabrous; rachis slender, weak, pale when dried, but sometimes purpurascent, often fibrilloso-squamose at the base of the pinnae; pinnae pinnae numerous, 15-28 on each side, usually alternate, sessile, patent and often approximate, but the inferior ones apart and more or less reflexed and gradually diminished in size, narrowly deltoid lanceolate, and usually acuminate, but narrowly deltoid and acute or obtuse in the inferior ones, truncate or subtruncate at the base, pinnatifid with closed sinus attaining about 4 cm. long in the middle ones; lobes elliptical or ovate-oval, rounded or obtuse at the apex, irregularly pin/crenate or

pauci-serrate, the upper basal ones largest and oblong; venation conspicuous, often slightly elevated beneath when dried; veins erect-patent, flexuous, pinnate; venules loose, erect-patent, simple or sometimes furcate. Sori proportionally large, 1-5 (their lowest ones forming a row on each side of the midrib apart from it) to each lobe of pinnae, but more numerous in the upper basal lobe, dorsal on the upper portion of the venules, elevated, hypocrepiform or reniform or elliptical; indusium thinly membranaceous, entire or suberose on the margin, persistent. Sporangia obovato-ovate, the pedicel
(P. 279).
about as long as the case; spore elliptical, rugose, yellowish.

Near Athyrium yokoscense (Franch. et Sav.) Christ, with a simpler and much smaller frond.

Japan Luzon, China: Yunnan, Chihli, Shensi.

Var. purdomii Ching.

Athyrium mongolicum (Franch.) Diels var. purdomii C. Chr., Bot. Gaz. 45: 4. 1913.

Differ from the type in rhizome being scarcely creeping, the apex clothed in dark-brown shining linear long-acuminate dense scales; the base of pinnae unequal; i. e., the anterior lobes scarcely enlarged; lobes approximate, almost square with truncate apex, which is slightly crenate or obtusely dentate. Indusium large, persistent, thin, almostly all reniform, some horseshoe-shaped, never straight.

Shensi: Tai-pei Shan.

7. Athyrium sargentii C. Chr. Bot. Gaz. 56. No. 4. (1913).

Rhizome erect, clothed in broad, reddish-brown scales. Stipes densely fasciculate, pale, base black and thickened, 2-3 cm. long, naked. Fronds lanceolate, about 20 cm. long, 6-7 cm. broad in the middle, rachis slender, sulcate and clothed in many-celled soft hairs. Pinnae 15-20-paired, sessile, erecto-patent, the lowers ones reduced and deflexed, the middle ones much the largest, 3-3.5 cm. long, scarcely 1 cm. broad, oblong, base scarcely auriculate, costa and costules on both sides sparingly hairy, deeply pinnatifid. Lobes spreading, separated by acute sinuses, acute, entire or slightly crenate, apex obtuse or truncate; veins 4-paired, simple, ascending; sori 3-4 to a lobe, medial; indusium short (scarcely 2 mm. long) linear-ovate or ovate, turgid, pale green, margin entire, persistent, not horseshoe/-shaped or reniform.

Shensi: Tai-pei Shan.

8. Athyrium wilsoni Christ, Bull. Boiss. II, 3. 512, (1903);
Matthew 350, (1911).

Ample; stipes and rachis dark-purple, scarcely clothed at base with ovate-lanceolate, pale brown scales, otherwise the entire plant glabrous, thick as a goose's quill, 15 cm. long. Lamina 70 cm. long, 25 cm. broad, ovate-acuminate, decurrent below; pinnae about 25 on each side under the pinnatifid apex, the lower pinnae opposite; remote, strongly decurtately deflexed, the middle ones alternate, confert, patent, 15 cm. long, 2. cm. broad, sessile, lanceolate-caudate, cut all way down to a wing 1 mm. broad; lobes erecto-patent, numerous, about 30 on each side of the costa, confert, sinuses acute, oblong, truncato-obtuse, 5 mm. broad, entire, and minutely undulate; veins simple, on each side hence scarcely incurved, linear, brownish-red. 2 or 2½ mm. long; indusium very narrow, filiform, lemon-yellow; texture thinly herbaceous, color obscurely green.

Hupeh: Chang-yang.

9. Athyrium macrocarpum (Bl.) Bedd. Ferns. S. Ind. t. 152, 153, (1863); Matthew 349, (1911).

Aspidium macrocarpum Blume, 1828.
Athyrium foliolosum Moore, 1860.
Lastrea macrocarpa Moore, 1858.
Asplenium macrocapum Bl., 1860 HKBK. 227.
Asplenium punctaceule Bl., 1828.
(P. 280).
Aspidium lanceum Kze., 1845.
Aspidium halconense Christ., 1908.

Stipes 15-23 cm. long, firm, erect, straw-coloured, scaly below. Fronds 30-40 cm. long; 15-23 cm. broad, ovate-lanceolate, cut down to the rachis into numerous oblong, rhomboidal pinnules, which are incisocrenate or pinnatifid; texture herbaceous; rachis naked; lateral veins of segments forked; sori copious, large; indusium oblong-reniform, 1.7-2 mm. broad.

Himalayas, Ceylon, Java, Korea, China: Kweichow, Chefoo, Yunnan, Szechwan.

10. Athyrium filix-foemina (L.) Roth. Rom. Mag. 2^1. 106, (1799); Christ 223; HNfl. 214.

Polypodium filix-foemina L., 1753.
Asplenium filix-foemina Bernh, HKBK. 227.
Athyrium rhaeticum Roth., 1800.
Asplenium pectinatum Wall., 1828.

Stipes tufted, 15-30 cm. long, firm, erect, straw-coloured or brownish, scaly below. Fronds 30-90 cm. long, 1530 cm. broad, oblong-lanceolate, with numerous pinnae, the lower ones spreading, lanceolate, 7.5-15 cm. long, 2.5-5.3 cm. broad, cut down to a compressed winged rachis into lanceolate or ovate-rhomboidal pinnules, which are again deeply inciso-pinnatifid; texture thinly herbaceous; rachis naked, slender;

veins pinnate in the lobes, sori linear-oblong, the lower ones often curved.

A widely dispersed species including quite a member of forms under different names, ranging from Arctic Europe through Himalayas, Japan, America, Cuba, Caraccas and Venezueda Korea and China: Manchuria, Kweichow, Szechwan, Hupeh, Shansi, Chihli.

Var. paleosum Milde, Christ, Bot. Syst. I. 48, (1908); Matthew 349, (1911).

This variety represents a form of Athyrium filix-femina var. dentatum Doell, but stipes and rachis provided with abundant brown lanceolate-subulate scales 5 mm. long; sori ovate.

Yunnan.

11. Athyrium muticum Christ. Bull. Geogr. Bot. Man. 147, (1907); Matthew 348, (1911).

Rhizomes erect, short, black, densely radicose; stipes fasciculated, base clothed with lanceolate-acuminate brown scales 1 cm. long, verruculose, otherwise entirely glabrous, luteo-stramineous, 2 mm. thick, 12 cm. long. Fronds 24 cm. long, deltoid-oblong, acuminate, with base much the broadest, 12 cm. broad, bipinnate; pinnae much close, patent, about 15 on each side under the deeply incised apex, cut almost down to a very narrow wing, segments about 15 on each side, the lower ones 12 mm. long, 6 mm. broad, free, subpetiolulate, hastulato-ovate, i. e. base auricled on both sides, the upper ones very close, unequal, i. e. the upper side of the base truncate, rhomboidal-oblong, all obtuse, the margin reflexed upward, very minutely denticulate or almost entire, the upper pinnae rounded, crenate, antice auriculate; veins hidden, pinnate or forked in the segments; sori lanceolate, more or less curved, sometimes truly athyrioid, many to a segment, infused, turgid, 2-3 mm. long, indusium oblong, gray, almost persistent, entire; texture coarse, coriaceous, corrugated, color dark-brown when dried, (F. 281).
upper surface almost lustrous.

Kweichow.

12. Athyrium subsimile Christ, Bull. Soc. Bot. Ital. 29, (1898).

In general habit, the species is closely allied to A. thelypteroides and A. giraldii, but the segments separated by broader rounded sinuses, the lobes ovato-obtuse, not decussate, nor denticulate at the apex, but subentire or only slightly crenulate; sori not extend to the apex of the segments but borne only on the lower part near the costa, shorter, ovate and straight; indusium linear-lanceolate, not turgid nor persistent, but thin and soon evanescent. Texture coriaceous, color dark-green.

Shensi, Hupeh, Kiangsu.

13. Athyrium goeringianum Moore, Ind. 186, (1860); Matthew 349, (1911).

Aspidium goeringianum Kze., Bot. Zeit. vi. 557. 1848.
Lastrea goeringiana Moore, 1858.
Asplenium goeringianum Mett., Asplen. 198, t. 6. f. 11,
12. 1859.

Rhizome not seen. Stipes slender, pale straw-colored, thickened towards the base and covered [illegible] scales downward, 15 cm. long; fronds triangular, 25 cm. long and about as broad, acuminate, texture thin herbaceous, rather glabrous, venoso-striate, discolored, bipinnato-pinnatifid, apex simpler; pinnae subsessile, patent, curved, broadly lanceolate, [illegible] auricled at base, very long-acuminate, [illegible], incised-pinnatifid, the lower ones smaller; segments 2.5 cm. long, 7 mm. broad, oblong, [illegible], [illegible], slightly serrulate, with [illegible]; sori fuscous, solitary, borne near the base [illegible] the auricles, [illegible]; [illegible] partial [illegible], [illegible].

In habit and dimensions, the species closely resembles Dryopteris [illegible], but differs by its [illegible] segments and [illegible] pinnules, the lower pinnae provided at the base with one smaller pinnule on each side.

Japan, China.

14. Athyrium drepanopterum (Kze.) A. Br.; Milde, Fil. Eur. 49, (1867); Matthew 349, (1911).

Polypodium drepanopterum Kze., 1850.
Aspidium drepanopterum Mett., Fil Lips. [illegible],
1856.
Polypodium oxyphyllum Wall., 1828.
Polypodium oxyphyllum Wall., 1828, Hook [illegible]. 1846.
Asplenium oxyphyllum Mett., 1860, [illegible].

Stipes firm, erect, 15-[illegible] cm. long, stramineous, clothed at the base with [illegible] lanceolate-acuminate [illegible] scales. Fronds [illegible]-60 cm. long, [illegible]-[illegible] cm. broad, lanceolate, with several distant pinnae on each side, which are [illegible] cm. long, [illegible]-5 cm. broad; pinnules lanceolate, sometimes auricled on the upper side, in the larger forms [illegible], [illegible]; texture [illegible]; rachis firm, naked straw-coloured; veins [illegible], midway between the [illegible], [illegible].

[illegible], Java, Japan, [illegible], Hupeh, [illegible],
Kiangsu.

In habit and cutting, the species appears somewhat similar to [illegible] japonicum, but more [illegible] and lower part of stipes covered with some long linear-subulate brown paleae. (F. 263).

Var. brevicaudatum (Bak.) Christ, Not. Syst. I. 46. (1907); Matthew 348, (1911).

Polypodium drepanopterum var. brevicaudatum Baker

Differs from the type in smaller fronds; fronds [illegible] pinnatifid, [illegible], [illegible], [illegible], distinctly [illegible]-crenate; sori [illegible], submarginal. [illegible], [illegible].

Yunnan.

Var. funebre Christ, Not. Syst. I. 46, (1909); Matthew 348 (1911).

Differs from the type in smaller size; fronds bipinnatifid; segments lanceolate, obtuse, margin inflexed and [illegible]; sori confluent, [illegible].

Yunnan.

Var. decompositum Christ, Not. Syst. I. 47, (1909): Matthew 348, (1911).

Larger size, tri- and [illegible] quadripinnatifid; pinnules petiolate, [illegible]; the tertiary segments [illegible], deeply incised: [illegible], [illegible] [illegible] [illegible].

Yunnan.

15. Athyrium [illegible] Diels, Engl. Jahrb. 29. 195 (1900); Fl. Cent. China 156; Matthew 350, (1911).

Stipes about 20 cm. long, glabrous smooth, violate and so [illegible], [illegible]. Lamina [illegible], dilatately triangular, bipinnate, 30-40 cm. long, 25 cm. broad, pinnae subsessile, horizontally patent, about 15 pairs, scarcely angustate towards base, [illegible], [illegible] lanceolate, the lower ones 12.5 cm. long, 3-3.5 cm. broad, pinnately cut [illegible] pinnules [illegible] sessile, elliptical-rhombic, the upper side subauriculate, lobulate, the largest ones 1.5 cm. long, 8 mm. broad; lobules [illegible], veinlets often bifurcate.

Szechwan - [illegible].

A [illegible] species, likely a form of A. [illegible]

16. Athyrium [illegible] Christ, Bull. [illegible]. Bot. [illegible]. 124, (1906).

Rhizome short, thick, densely clothed with [illegible] brown scales 1 cm. long; leaves fasciculated, numerous, all

naked; stipes slender, fragile, 6-8 cm. long, stramineous. Lamina 13 cm. long, 6 cm. broad, lanceolate, base subattenuate, bipinnatifid; pinnae crowded, 3 cm. long, [illegible] cm. broad, about 20 under the pinnatifid apex, subsessile, broadly ovate-rhomboid, base unequal, the lower basal side cuneate, the upper auriculate, deeply pinnatifid, the lower lobes almostly free, lobes close, broad ovate, very obtuse rarely subacute, about 8 on each side, distinctly serrate, teeth patent, veins pinnate in lobes, sori 3 on each side of costule, rounded, 1 mm. broad, brown, indusium reniform-[illegible], [illegible], pale; texture herbaceous, color dark-green.

Yunnan, [illegible]

17. __Athyrium wardii__ (Hk.) Mak. Bot. Mag. Tokyo, 13. 15, (1899); Matthew 380, (1911).

[illegible]

Asplenium wardii Hk., Sp. Fil. 3. 196. 1860; 2 Cent. t. 33; Hance, 1866.

[illegible]

Stipes 15-25 cm. long, erect, slender, [illegible], [illegible], scaly at or along the base. Fronds [illegible] cm. long, [illegible] cm. broad, [illegible], with numerous lanceolate pinnae on each side, the lowest [illegible] cm. long, [illegible] cm. broad, cut down to the rachis into numerous ovate-rhomboidal pinnules, which are 1.5 cm. long, 1.0 cm. broad, [illegible], the two sides unequal, the upper [illegible], the lower [illegible] truncate at the base, the edge very slightly crenate; texture thinly herbaceous; rachis slender, [illegible], [illegible], the central lateral ones [illegible]; sori [illegible] near the [illegible].

[illegible], Japan, Korea, CHINA: Chekiang, [illegible], Hunan.

18. __Athyrium nigripes__ (Bl.) Moore, Ind. [illegible] (1857); Ching 224; Matthew 9, (1911).

Aspidium nigripes Blume, 1828.

Asplenium nigripes [illegible], 1859.

[illegible] pallescens [illegible], 1860.

Asplenium costale [illegible], 1830.

Asplenium gymnogrammoides Klotzsch, 1853.

Stipes tufted, 15-30 cm. long, straw-coloured, [illegible], scaly below. Fronds 50-60 cm. long, 20-30 cm. broad, ovate-lanceolate, with numerous pinnae on each side, the lowest lanceolate, 15-23 cm. long, [illegible]-8 cm. broad, cut down to the rachis into numerous [illegible] pinnules, which are [illegible], the lower [illegible] toothed; texture herbaceous; [illegible] naked, straw-coloured, [illegible]; [illegible], often curved, 2.5-3.5 mm. long, [illegible] along [illegible] of the pinnules.

[illegible], Ceylon, [illegible], Java, Formosa, [illegible]; China: Kwangtung, [illegible], Chekiang, [illegible], [illegible], Hunan, Yunnan.

- Resembling Athyrium macrocarpum in genertal habit, but differs in sori.

A very variable common fern, not uncommon with lower pinnae moderately reduced, and wing decurrent from the basiscopic side of the pinnules, while the acroscopic side either rounded or somewhat auricled and free.

Var. mearnsianum Copel. Phil. Journ. Sci. III. C. 291 (1908).

Caudex and the base of stipes clothed with almost black paleae, sori about 2.5 cm. long, pinnules acutely dentato-serrate.

Philippine.

A specimen in University of Naking Herbarium seems representing this variety.

Var. clarkei Bedd. Ferns Br. Ind. 166, (1883).

Athyrium clarkei Bedd., Ferns. Br. Ind. Suppl. 11, t. 360, (1876).

Fronds linear-lanceolate, up to 40 cm. long, and 7.5-10 rarely 15 cm. broad, gradually narrowed at both sides, generally rooting from a bud on the upper side of the rachis; rachis of pinnae, costa and veins sometimes furnished with a few weak setae. n/h/

Beadome feels quite certain that the is only an elongated variety of Athyrium nigripes.

Nepal, Sikkim, China: Kweichow.

Var. elongatum Christ, Bull. Boiss. VII. 13 (1899); Matthew 350, (1911).
(P. 284).
A transitionary form towards Athyrium filix-faemina with oval frond less deltoid, pinnae and pinnules much less close together; texture thinner.

Yunnan; Mentze.

Var. tenuifrons Bedd. Ferns Br. Ind. Suppl. 33.

Athyrium unnifrons Wall., Cat. 206.

Frond oval in outline, attenuate towards base, pinnules strongly confert, imbricate, deeply rotimdpauriculate, strongly lobed, sori broad, turgid.

India, China: Yunnan - Wentze

19. Athyrium monticola Ros., Fedd. Repert. 13, 123, (1914).

Rhizomes creeping, about ½ cm. thick, with very dense and branching roots and covered at apex with ferruginous, narrowly lanceolate paleae about 5 mm. long, 1 mm. broad; stipes dense, to 20 cm. long, about 1 mm. thick, base flexuous, blackish, the upper part like rachis stramineous, clothed sperscely in paleae which are linear, brownish, shinging, about 3 mm. long. Lamina deltoid-oblong, shortly acuminate, to 30 cm. long, 10-12 cm. broad, herbaceous, lightly green, blackish when dried glabrous, bipinnat-pinnatifid or subtripinnate; primary pinnae about 14 on each side below the pinnatifid apex, erecto-patent, petiolate petioles to 1 cm. long), those below the middle much the largest, to 10 cm. long, 4 cm. broad, slightly contracted at base, oblong lanceolate, shortly acuminate, the basal ones close, slightly shorter about 4 cm. apart; the secondary pinnae, about 10 on each side, below apex pinnatifid, erect patent, petiolate, truncate, subpinnate in the lower ones, to 2½ cm long, 1 cm. or slightly more broad; segments (the tertial pinnae) linear, obtuse; adnate, inciso-crenate or shortly-deticulate at apex; veins in segments pinnate, the lateral veins furcate or simple; sori borned near the base of upper branching of veins, subrounded; approximate to the secondary costa; inducium mostly scale-like, oval or reniform, fimbriate.

Yunnan: Tong-chuan

Differing from Athyrium spinulosum Milde by more elongated blade and notched or only shortly teethed segments and also by its more close blades, thicker rhizomes and smaller paleae.

20. Athyrium unifurcatum (Baker) C. Chr. Medd. Göt Bot. Trädg, I. 75, (1924).

Dryopteris unifurcata C. Chr., Ind. Suppl. 40, (1913).
Nephrodium unifurcatum Baker, JoB. XXVI, 228. 1888.
Dryopteris pandiformis C. Chr., Ind. 282, 1905; Matthew 365. 1919.
Aspidium pandiformis Christ, Bull. Geogr. Bot. Mans. 255. 1902.
Christella pandiformis Lev., 1915.

Stipes naked, dull brown, 30-37 cm. long; lamina oblong-lanceolate, 45-60 cm. long, 20-25 cm. broad, bipinnatifid, membraneous, green and glabrous on both surfaces; rachis dull brown, obscurely paleaceous; pinnae lanceolate, the lowest not reduced, 10-12.5 cm. long, 2.5-3.1 cm. broad, cut down regularly to a narrow wing into parallel, oblong, obtuse, subentire or slightly lobed segments 6 mm. broad; or in large specimens the lamina being tripinnatifid with the lowest parts of the pinnae shortly petiolate, the pinnules deeply pinnatifid; veinlets of the pinnules 7-8-jugate, forked, sori medial; very short, inducium small, reniform or obliquely so, sometimes distinctly hooked, more rarely short

oblong, glabrous persistent.

Kweichow, Szechwan. - Omei Shan.

(P. 285).
In size, shape, texture and cutting, nearly identical with Athyrium unifurcatum (Bak.). Chr. from which it differs chiefly in pubescence. The stipes is covered throughout with large and soft, ovate, light brown scales, and similar scales are aggregated at the base of the opposite sessile pinnae beneath; costa shortly setose above, sparcely downy beneath, margins ciliate with some minute fibrils.

Szechwan.

It is possible that the specimens are young fronds of typical Athyrium unifurcatum with the scales and hairs still retained.

21. Athyrium acrostichoides (Sw.) Diels, 223, (1899); Matthew 348, (1911).

Asplenium acrostichoides Sw., Shrad. Journ. 1800^{2}. 54, 1801.
Asplenium thelypteroides Michx., 1803, HBK. 226, 489.
Athyrium thelypterlides Desv., 1827; Christ 223.
Diplazium thelypteroides Presl., 1836.
Arthyrium allantodioides Bedd., 1867.
Arthyrium pycnosorum Christ, Bull. Boiss. II. 2. 827. 1902.

Stipes 30 cm. erect, polished, straw-coloured. Fronds 35 cm. long, 15-30 cm. broad, lanceolate, with numerous spreading pinnae, the lower ones 10-15 cm. long, 2.5 cm. broad, cut down to a broadly winged rachis into numerous nearly entire elliptical spreading pinnules; texture herbaceous, rachis sometimes slightly hairy, sori in close regular rows reaching nearly from the midrib to the edge, slightly curved, the lower ones often doubled.

Canada, United States, Himalayas, Korea, China: Manchuria, Chihli, Shensi, Hupeh, Szechwan, Kweichow, Yunnan, Hunan.

Easily distinguished from its allies by its long sori arranged in very regular rows.

Var. henry Chris, Bull. Boiss. vi. 961, (1898); Matthew 348, (1911).

Differs from the himalayan type in its base of the stipes being clothed in long patent lanceolate-subulate dark-fuscescent scales; leaves not attenuate, but deltoid at base, posterior pinnae of equal lengh sori not diversed.

Yunnan: Mentze.

22. Athyrium macdonellii Bedd. Handl. Suppl. 34. (1892); Matthew

349, (1911).

Asplenium macdonellii Bedd., JoB. 73, (1889).

Rhizomes strong, creeping, stipes much thickened at the base, about 30 cm. long, furnished with a few deciduous large lanceolate scales, and furfuraceous, as is the rachis with towny curled hair-like scales. Fronds pinnate, about 35 cm. long, 2025 cm. broad at the base, ovate to deltoid-lanceolate; pinnae lanceolate, about 18-20 pairs, alternate or subopposite, 10-13 cm. long, about 3.8 cm. broad, pinnatifid nearly to the midrib, leaving only a winged margin to the villose partial rachis; pinnules ligulate, oblong from a square base, about 6 mm. broad, cut about one-third down into small oblong lobes; texture herbaceous, surfaces naked or nearly so; veins 1 to each segment, not reaching the margin; inducium athyrioid or asplenioid, generally very hippocrepiform, never diplazioid.

Himalayas, China: Szechwan, Hupeh.

23. Athyrium niponicum (Mett.) Hance, Journ. Linn. Soc. 13. 92. 1873;

(P. 266)

NPfl. 224; Matthew 340 (1911).

Asplenium niponicum Mett., 1866; MKBK. 227.

Rhizomes creeping, scales lanceolate, reddish; stipes 15-30 cm. long, glossy, stramineous. Fronds 30 cm. or more long, 15-20 cm. broad; bipinnate, pinnae lanceolate, distinctly stalked, cut down nearly or quite to the rachis below into oblong-lanceolate unequal-sides pinnules, which vary from subentire to deeply pinnatifid; texture herbaceous, rachis and sides naked, often tinged purple; sori copious, the lower ones often quite horsehoe-shaped.

Japan Korea, China: Anwhei, Kiangsi, Chefoo, Hunan, Hupeh, Kiukiang, Kiangsu, Shantung, Manchuria.

f. rubellum Komerov, Fl. mansh. I. 135, (1901).

Rachis red, gracile, short; frond distinct stipitate, 30 cm. long to 10 cm. broad, greyish-green above.

North Corea, China: Mukden, South Ussure.

24. Athyrium henryi (Bak.) Diels NPfl. 224, (1899).

Asplenium henryi Bak., Ann. Bat. 5. 306, (1891); New ferns. 46.

Stipes long, naked, tufted, stramineous. Fronds oblong-lanceolate, bipinnate, moderately firm, glabrous 30-60 cm. long. Pinnae sessile, lanceolate, the largest 15-20 cm. long, 3.8 cm. broad, cut down nearly to the rachis into

oblong crenate secondary lobes 4 mm. broad. Veins 9-10-jugate in secondary lobes; veinlets forked; sori medial much curved; indusium glabrous, persistent.

Yunnan Szechwan, Hupeh; Patung.

Near Athyrium acrostichoides (Sw.) Diels.

25. Athyrium pachysorum Christ, Bot. Syst. I. 48 (1909); Matthew 350, (1911).

Plant smooth, stipes stramineous, slender, 1.5 mm. in diameter, clothed at base with atratous-subulate dark-brown abundant scales 1 cm. long. Fronds bipinnatifid, 20 cm. long, 11 cm. broad, acuminate, base scarcely narrowed, the lower pinnae remote, 3 cm. long, 3 cm. distant, the upper ones approximate, about 20 on each side, the lowers ones opposite, sessile, base dilated but not decurrent, the upper ones unequal of base, more broadly adnate, the middle ones 5 cm. long, 11 mm. broad, incised to a narrow wing, linear-lanceolate, acuminate; segment pectinato-imbricate, about 12 on each side, base sub-unequal, shortly crenato-subdentate, obtuse, ovate, 7 mm. long, 3.4 mm. broad; veins manifest, black, those in the segments pinnate and forked; sori large, marginal, 3-4 on each side of the segment, 1.5 mm. broad, contiguous turgid, ovate, or rounded, indusium persistent, gray, ovate or athyrioid; texture herbaceous, color obscurely green.

Kiangsu - Shanghai; Kiangsi - Lushan.

26. Athyrium petiolosum Christ, Bull. Geogr. Bot. Man. 134, (1907); Matthew 350, (1911).

Rhizomes oblique, stipes few, fasciculated, base atratous, thickened, rarely covered with sparce setiform atratous scales, 12-20 cm. long, other parts naked. Fronds elongate-oblong, to 45 cm. long, base scarcely narrowed, 15 cm. broad at the middle, long acuminate, pinnae alternate, close, manifested] petiolated, about 20 on each side, broadest at base and almost equally triangular-ovate, acute, 7 cm. long, base 3½ cm. or more broad, pinnate down to a wing; pinnules 12 on each side, rather obtuse, ovate, the lower and middle ones with free
(P. 287).
base, the basal ones much the largest, but with upper and lower sides almost equal, 2½ cm. long, 1 cm. broad, deeply lobed, lobes cuneate-ovate, obtuse, dentate, sometimes aristate, veins pinnate in lobes; sori close to costa, numerous, 5 or more on each side of the costa, biseriate near the base, oblong, straight, 2 mm.long, dark-brown; indusium ovate, thin, flaccid, light brown; texture thin color flavido-green.

Yunnan.

27. Athyrium yokoscense (Fr. et Sav.) Christ; Bull. Boiss. 4. 668 (1896); Mak. in Flora Jap. 11, 17-18.

Asplenium yokoscense Fr. and Sav., Enum. pl. Jap. 2. 225. 622, 1879.

Caudex short, erect or ascending, thickly covered with castaneous basal remanant of the old stipes. Stipes caespitose, clothed with scales towards the base, pale-stramineous, to about 28 cm. long, but sometimes much shorter and 3½ cm. long, scales lanceolate to linear, acuminate, entire, firmly or thinly membraneous, ferruginous and concolorous, but often castaneous, except the margin. Frond oblong or oblong-lanceolate, acuminate, bipinnatifid or subpinnate, 16-34 cm. long, 5-17 cm. broad firmly herbaceous, glabrous; rachis slender, sometimes fibrilloso-squamose, below; pinnae 12-18 on each side, patent or sometimes erect-patent; often more or less deflexed in the inferior ones, subsessile, alternate or sometimes subopposite, lanceolate or angustato-lanceolate often falcate, acuminate, truncate at the base, deeply pinnatifid or subpinnate, usually a little apart or approximate or subapproximate ovato-lanceolate, or oblong lanceolate, acute or shortly-acuminate, sharply serrate or crensate-serrate, usually auriculate at the upper base, the upper basal-pinnale much larger; venation conspicuous; veins flexuous, pinnate; veinlets erect-patent, loose; simple or the lower ones furcate or paucipinnate. Sori small, 1-many to each pinnules, often confluent when matured, dorsal on the upper portion of the veinlets, oblong, but the lower ones reniform of obliquely hippocrepiform; indusium very thinly membraneous, margin entire sporantia obovato-oval, the pedicel equal or shorter than the base; spores elliptical, alatorugose.

Widely distributed in Japan, recently discovered in China: Anhwei - Chu-hwa Shan.

28. Athyrium fasciculatum Hand.-Mzt. Sym. Sinc. 31, Pl. 2. f. 5. (1929).

Rhizome short, about 0.5 mm. thick, black, covered with very densely paleaceous (laxly fasciculate dead fronds and stipes; paleae long subulato-acuminate, about 5-10 mm. long and broad at the base, subdenticulate or sparcely denticulate at the base, ferruginous often more obscure in the middle. Frond 18-68 cm. long. Stipes half as long as the frond, 6.5-28.5 cm. long, sulcate above, convex below, pale brown, covered at the base with similar scales as on the rhizome, naked ~~and glabrous apically~~. Lamina lanceolate or ovato-lanceolate, cuadato-acuminate, 12-34.5 cm. long, to 10.5 cm. broad, simply pinnate, texture herbaceous, obscure green above, paler beneath. Rachis of the same shape and color as the stipe. Pinnae 20-27 pairs, the uppermost confluent under the long caudate serrated apex, sessile, or the lowest ones very shortly petiolulate, to 6.5 cm. long, and 16 mm. broad, patent, slightly curved upward the lowest ones sometimes slightly smaller than the rest, linear-lanceolate, elongatedly narrowed, cut

½-2/3 way down into 1-10 pairs of lobes, the lowest lobes slightly irregularly auriculated, the upper ones gradually simpler and smaller, and slightly serrulated with the serrated apex. Costa rigid, sulcate above, prominent below, veins fine; slightly pinnate. Sori near the margin, short, 1 mm. in diameter, usually irregular or crescently confluent; inducium rudimentary; sporangia long-stipitate, pale ferrugineous. Spores pale-colored, obscurely reticulated.

Szechwan.

Somewhat related to A. mupinensis Christ, differs in the lowest pinnae not decrescent and fronds less divided.

29. Athyrium mupinense Christ, Bot. Gaz. 51. 355, (1911).

Rhizomes short, erect, radicose, like the base of stipes clad in dark brown flexuous setae almost to 0.5 cm. long, attached to warts; stipes fasciculated, numerous (about 12), thin flaccid, stramineous, 5 cm. long; lamina 20 cm. long, 5.5 cm. broad, acuminate, slightly angustate towards the base, lanceolate-oblong, bipinnate, rachis slender, sparcely setose, glabrous in other parts; pinnae 25-30 on each side, alternate, approximate, erect patent, deltoid-ovate, acute, petiolulate, base unequal, i. e. the anterior basal pinnules broadened, 2 cm. long, 1.2 cm. broad at base, incised to a narrow wing, pinnules confert, sessile, the lowest ones rarely subpetiolulate, about 7 on each side; oblong, subobtuse, base unequal i. e. broaden on the anterior side, 1 cm. long, 3 mm. broad, acute, but shortly serrate not aristate; sori rounded, scarcely 1 mm. broad, brown, about 4 on each side, medial, not confluent, inducium fugaceous, reniform; texture flaccid, herbaceous, color obscure green.

Yunnan, Szechwan.

30. Athyrium delavayi Christ, Bull. Soc. Fr. Mem. I. 47, (1905); Matthew 348, (1911).

Athyrium mairei Ros., Fedde. Repert. 13; 125. 1913.

Stipes clothed at the base with subulate black scales, obtherwise entire plant glabrous, slender, stramineous-gray. Lamina ovate, 30 cm. long, 15 cm. broad, attenuate towards base, apex caudato-acuminate. Pinnae sessile, close; caudato-acuminate, 10 cm. long, 1 cm. broad; about 30 pairs on each side; pinnules sessile, conferto-imbricate, numerous; about 24 below the serrated apex, obtuse, ovate-rhomboidal, unequal, anterior side of the base obtusely auriculate, crenato-dentate, veins pinnate in pinnules; sori medial, 6-8 to a pinnule, small, scarcely 1 mm. broad, ovate, inducium ovate, gray, fugaceous; texture herbaceous; color obscurely green.

Yunnan, Szechwan, Hupeh.

31. Athyrium mairei Ros., Fedde Repert. 13, 125, (1913).

Rhizomes erect, densely clothed with reddish, subulate paleae about 12 mm. long; stipes densely fasciculated with paleaceous base, naked and smooth, ochraceo-stramineous upward, about to 20 mm. long, scarcely 2 mm. thick in the middle. Lamina subtruncate, slightly narrowed at base elongate-oblong, acuminate, about 35 cm. long. 15 cm. broad; bipinnate, light-green, 25 on each side, below the pinnatifid apex, subapproximinate, sessile, linear-oblong, acuminate, the middle ones much the largest, about 10 cm. long, 1. cm. broad, the lowest ones about 5 cm. long; pinnules about 16 on each side, rather remote, shortly petiolate, trapezoid-ovate, obtuse, subauriculate, coarsely denticulate; veins in auricules pinnate, the others furcate or simple;
(P.-289).
sori 3-4 on each side, close to the costules, 2 mm. long, linear; indunium ochraceous, firm, entire, persistent.

Yunnan: Long-Y valley

This species is allied to Athyrium deavayi Christ, but the latter distinguishes itself by black rhizomatic scales, more pinnules, shorter and oval sori, etc.

32. Athyrium fissum Christ, Not. Syst. I. 47, (1909); Matthew 349, (1911)-[illegible]

Plant glabrous; stipes 1 cm. long, thick as a ravents quil clothed at the base with subulate-filamente brown sparce scales 3 mm. long, stramineous. Fronds about 40 cm. long, towards apex sututo-angustate and acuminate-caudate, oblong, 16 cm. broad, tripinnatifid, slightly narrowed towards base; pinnae drecto-patent, remoste, with interstitial spaces 4-5 cm. broad, about 12 on each side, below the pinnatifid apex, distinctly petiolate, 12 cm. long, 3 cm. broad, broader at the posterior side of the base, oblong, long-caudate; pinnules confert, about 20 on each side, patent, the lower and middle ones deltoid-ovate, subacute, 2 cm. long, 1 cm. broad, the lower ones petiolate, the upper ones connected by a narrow wing decurrent along rachis, deeply incised, the upper ones lanceolate, base sub-unequal, dentate; lobes imbricate-pectinate, about 10 on each side, 1.5 cm. broad, ligulate, subacute, denticulate, sori densely crowded, up to 5 on each side of the lobe, ovate, scarcely 0.5 mm. long, which probably are ~~a~~ the smallest sori ever found in the genus, ochraceo-brown; inducium gray, ovate, anthyroid towards the base of lobes; texture herbaceous, color light green.

China: Yunnan.

33. Athyrium viviparum Christ, Bull. Geogr. Bot. Man. 13 (1910).

Rhizomes short, erect, radicose, slender, conspicuously

Rhizomes short, erect, radicose, slender, conspicuously arising from a bud which is covered by brown scaly-subulate sparce scales; leaves solitary or sparingly fasciculated; stipes slender, 25 cm. long, stramineous, naked, except a few subulate brown scales attached at the base, the entire plant naked. Fronds 60 cm. long, 14 cm. broad, oblong-acuminate, base not attenuate, bipinnate; with pinnae the lower ones to 6 cm. apart, alternate, the upper ones close; very shortly petiolate, about 20 on each side below the pinnatifid apex, ovate-caudate, 8 cm. long, with base almost 3 cm. broad, costa slender, scarcely winged; pinnule close, unequal, the lower side of the base cuneate, the upper side auriculato-truncate, ovate, obtuse, subsessile, about 20 on each side, 12 mm. long, 6 mm. broad, lobated, the lower lobes rarely incised down to the costule, but usually down to the middle of the pinnules, or much less, very small, lobes about 5 on each side, obtuse, but serrate and aristately dentate; sori very densely crowded, ovate, confluent, 2 mm. across, brown, indusium inconspicuous, very densely crowded, ovate, confluent, 2 mm. across, brown, indusium inconspicuous, very narrow, entire, dark-brown, straight or slightly curved; texture herbaceous, color ochrec-green, opaque; lamina exceedingly proliferous under the apex.

Kweichow.

34. Athyrium roseum Christ, Bull. Boiss. 6. 961, (1898); Matthew 350, (1911).

Rhizomes thick, erect, and like the base of stipes clothed in blackish lanceolate-subulate dense scales; stipes sparingly fasciculated, glabrous upward and so is the other parts, slender, erect with rosy lucid~~u~~ous rachis, 22 cm. long; leaves 35 cm. long, 15 cm. broad, deltoid-ovate, acuminate, bipinnate, the ultimate pinnae nost reduced;
(P. 290).
pinnae patent, apex curved upward, almost caudato-acuminate, 10 cm. long, 17 mm. broad, rachis free pinnatifid only near apex, pinnules close almost imbricate, 16-20 on each side, oblong, very obtuse, truncate on the lower side of the base, angulo-erect auriculate (auricle obtuse), acutely and almost aristately crenulate; texture herbaceous-flaccid, color pale green; veins in pinnules, pinnate, pinnules, - large dark brown, slightly curved, oblong, confluent, indusium narrow, flaccid, pale brown.

Yunnan.

25. Athyrium sinense (Baker) C. Chr. Ind. Suppl. 15, (1913).

Asplenium sinense Baker, Kew Bull. 4, 1906.

Caudex not seen; basal paleae linear, firm, dark-castaneous; stipes slender, stramineous, under 30 cm. long, naked above the base. Lamina oblong-lanceolate, bipinnate, 30 cm. long, 12-15

cm. broad, membranaceous, green and glabrous on both surfaces; pinnae lanceolate, sessile, base truncate, 7.5-9 cm. long, 1.8-2 cm. broad; the lower ones not reduced; pinnules oblong, obtuse, dentate, 4-6 mm. broad, upper side of the base straight, cuneate; veins pinnate towards the basal lobes in pinnules; sori 5-6-jugate, costulate, parallel, 4 mm. long; indusium membranaceous, glabrous, persistent.

Intermediate between Athyrium acrostichoides (Sw.) and Athyrium nigripes (Bl.).

Yunnan, in Mountains.

26. Athyrium anisopterum Christ in Bull. Boiss. 6: 962 (1898), Bull. Geogr. Bot. Mans. (1907) 133; C. Chr. Ind. 139 (1906); Matthew in Journ. Linn. Soc. 39: 348 (1911).

Athyrium fauriei Mai. var. elatius Christ, Bull. Boiss. 6: 193 (1898).

Rhizome thick, short, oblique, stipes slender, fasciculate but few (3-4) together, base incrassate, dark brown or blackish, clothed in moderately dense brown scales, stramineous upward, 25 cm. long, glabrous in other parts; frond to 28 cm. long, to 8 cm. broad, somewhat broader towards the base, gradually attenuate towards the apex, oblong-lanceolate, bipinnatifid or sparcely bipinnate near the base; pinnae about 17 on each side, alternate, petiolate, the lower ones horizontally-patent, remote, the lowest much the largest, oblong-deltoid, strongly unequal, truncate or cuneate on the under side at the base, auricled on the upper side, apex rather acute or shortly acuminate, the largest to 5 cm. long, 2.5 cm. broad pinnate near the base, deeply pinnatifid above; pinnules or lobes oblique, oblong, ovate, obtuse, about 7 on each side, the base pair in the lower pinnae usually free, the superior on much the largest, thus making the pinnae appearing auricled, contiguous to or somewhat imbricate on the rachis, indiso-crenate or deeply pinnatifid, the other lobes adnate to broad winged costa and only deeply incised towards the apex, the upper pinnae deeply inciso-lobed, lobes obtuse, obscurely crenate; sori numerous, large, 8, 7, 5 or 3 to each lobe, 1.5-2 mm. long, usually hippocrepiform or ovate, indusium persistent, gray, reniform; texture thin herbaceous, color obscurely green on both sides.

Yunnan, Hupeh, and also Luzon of the Philippine Islands.

A medium-sized fern of an elegant habit, easily recognized by its rather unequal pinnae, which are prominently auricled above and truncate or cuneate below and by large gray horseshoe-shaped sori with persistent indusia. It was first collected by A. Henry in Man-mei, Yunnan and latter by Pere Ducloux. In the same province; and also
(P. 291).
recorded in Luzon, the Philippine Islands, by Fonglon and Copeland.

37. Athyrium veitchii Christ, Bull. Geogr. Bot. Man. 123, (1906); Matthew 350, (1911).

Rizomes ascending, base incrassate and crowned with hard black leaves of previous growth, scales rare, brown, subulate, ½ cm. long; stipes fasciculate, slender, rufo-stramineous, 12 cm. long; lamina 24 cm. long, 4 cm. broad, oblong-elongate; acuminate, caudate, base scarcely narrowed, bipinnate or tripinnatifid; pinnae remote (the lower ones with interspaces 3 cm. wide) alternate, erecto-cadnate and pinnatifid apex, manifestedly petiolate (petiole 4 mm. long) strongly unequal at base, deltoid-oblong, acute, falcate; pinnules about 8 on each side, the lower ones petiolulate, the antherior side of the lower ones much the largest, ovate obtuse, subcuneate; 1 cm. long, ½ cm. broad; deeply lobed; lobes 3 on each side, obtuse; the middle pinnules unequal, lower side truncate, upper basal side subauriculate, rather acute, not deeply-lobulated, veins conspicuous, pinnate in pinnules, forked in lobes; sori medial or close to margin, placed on the apex of veinlets, small, under 1 mm. broad, rotundo-reniform, rarely elongate, indusium conspicuously gray, reniform, or ovate; texture herbaceous, color dark-green, whole plant glabrous.

West China: Szechuan.

A distinct member of the group of A. nigripes, with petiolulate and unequal pinnules; fronds narrowly lanceolate, long stipitate and gradually attenuated upward to a long serrate or subentire linear acumen. In habit, particularly, in younger forms, it is closely allied to A. anisopterum Christ, differs by fronds somewhat narrowed downward more or less deeply incised stalked pinnules, somewhat smaller acroscopic pinnules and smaller, sparse sori.

38. Athyrium imbricatum Christ, Bull. Geoge. Bot. Man. 123; (1906) Matthew 349, (1911).

Rhizome erect, thick, radicose, with the base of stipes clothed in brown subulate sparce scales 3 mm. long otherwise the plant glabrous; stipes fasciculated, stramineos, slender, 16 cm. long, lamina 22 cm. long; 12 cm. broad; broadly ovate-acuminate, base subattenuate, bipinnate or tripinnatifid; pinnae erecto-patent, mostly petiolate (petiole 6 mm. long), about 20 on each side, crowded, but the lower ones separate by interstices 3½ cm. wide; broadly ovato-acuminate, 8½ cm. long, 2 cm. broad, costa winged, pinnules imbricato-crowded, about 20 on each side, ovate, subequal, cuneate, the lower ones subpetiolate, subacute, cut down regularly to a broad wing, 2 cm. long, 9 mm. broad, lobes about 5 on each side, lanceolate, obtuse, deeply dentate, teeth spreading, very acute, sometimes aristate; veins slender, pinnate and forked; sori almostly straight, 1½ mm. long, 1 to each lobe, rarely two; indusium manifestedly pale, imbricate, lanceolate; texture herbaceous, color light green.

Szechuan, Omei Shan.

Seems a form of A. nigripes.

29. Asplenium longipes Christ, Bull. Soc. Fr. 52 mem. I. 48, (1905); Matthew 349, (1911).

Rhizome; perhaps creeping; stipes strong, 30 cm. long, base black, rufo-stramineous upward and like rachis and costa clothed sparcely in lanceolate-subulate ochraceous scales ½ cm. long or shorter fronds 22 cm. long, 15 cm. broad; deltoid, acuminate, base with ascending pinnae, cuneate; tripinnatifid; pinnae erecto-ascending, about 5 under the bipinnatisect apex, the lower ones remote (5 cm. apart), alternate, most shortly petiolate, oblong-acuminate, the lowest ones 15 cm. long,
(P. 292).
5 cm. broad, attenuate towards base, i. e. pinnules abbreviatis; pinnules sessile, about 20 on each side of the costa, the lower ones pinnate throughout, the pinnules of 3rd. order close, 4 mm. long, 1½ or 2 mm. broad, oblong, obtuse, acutely serrate; sori densely crowded, 8- or 12 to an ultimate pinnule, minute, ½ or ¾ mm. broad, broadly globose; rufo-ochraceous, not confluent; indusium rudimentary, semirotund or destitute.

Yunnan.

40. Athyrium viridifrons Makino, Bot. Mag. Tokyo, 13, 15 (1899).

Asplenium viridifrons Makino, Bot. Mag. Tokyo, 6. 46. pl. 15, 1892.

Caudex creeping, with a number of the thick bases of the old stipes. Stipes elongate, stramineous, scaly towards the base, compressed and thick at the base; scales rufous-brown, broadly lanceolate, acuminate, thinly membraneous; frond ample, deltoid, or ovate-deltoid, acuminate, tripinnatifid, light green, thin, herbaceous, very thinly dispersed with very minute linear scales; rachis slender, stramineous, nearly glabrate, naked but narrowly winged at the superior portions; pinnae nearly opposite, erect-patent, about 10-13 on each side, nearly sessile, oblong-lanceolate, broadest at the middle, acuminate, with narrow-winged rachis; pinnules spreading, lanceolate, acuminate sessile, slightly apart from one another, regularly deeply pinnatifid; segments spreading, numerous, regularly arranged a little apart from one another, oblong, slightly delated at the base, obtuse, crenulate or crenulato-lobed, 5-12 mm. long, 1½-4½ mm. broad; veins flexuos, pinnate; veinlets free, erect-patent, simple or often 2-forked, Sori minute, oval or oblong, nearer to the midrib than to the margin, oblique; dorsal, often horseshoe-shaped; indusium thinly membraneous, ciliated.

Japan, China: Honan.

Remarkable for the narrow-winged rachis of the pinnae and the green color even when dried.

41. Athyrium pseudo-setiferum Christ, Bull. Geogr. Bot. Man. 146, (1909) Matthew 350, (1911).

Stipes and rachis slender, green. Fronds deltoid-ovate, acuminate, 38 cm. long, 25 cm. broad, tripinnatifid, pinnae shortly petiolate, remote (the lower ones 5 cm. apart) erecto-patent, 13 cm. long, 4 cm. broad, shortly petiolate, oblong-caudate, base very slightly attenuate, pinnate, costa slender, almost raised, pinnules about 15 on each side, oblong-acute, the lower ones petiolulate, base equal, truncate, almost 3 cm. long, 1 cm. broad, profundly cut and in the lower ones incised down to costules, segments parallel, pectinate-close, 4 mm. long, 2 mm. broad, rather obtuse, entire, or very minutely denticulated, about 12 on each side; veins inconspicuous, pinnate in segments, 3 or 4 on each side, oblique, almost simple; sori minute, oblong, 1 mm. long, 2 or 3 to a segment, midway between costa and margin, brown, indusium ovate, grey, thin membranaceous, soon corrugate; texture flaccid herbaceous; color pale green.

Kweichow.

42. Athyrium multifidum Ros. Fedde, Repert. 13, 125, (1913).

Stipes about 90 cm. or more long, 2 cm. thick above base, stramineous, nitid, subglabrous; lamina to 90 cm. long, 50 cm. broad at base, oblong-lanceolate, acuminate, subrigid, herbaceous, rachis and costa sparcely and minutely glandulose, otherwise glabrous in all parts, quite green above, paler below, tripinnate; the primary pinnae about 20 on each side, alternate, very shortly petiolate (petioles not more than 8.mm. long), erect, linear-lanceolate, long acuminate, basal ones much the largest, to 40 cm. long; pinnae of second order petiolate (petiole 1½ mm. long) decurrently-winged, lanceolate, long acuminate, those below the middle above 7 cm. long, 1½ cm. broad, narrowly pinnatifid, to a wing along the rachis or pinnate; the segments (or tertiary pinnae) pinnatifid below the apex up to 10 lobes, patent, subpetiolate, rather remote, unequal at base, the upper side suberect-truncate, auriculate, the lower cuneate, narrow oblong, acute or obtusish, inciso-lobed, slightly hyalino-marginal, to 1 cm. long, 4 mm. broad; lobes 1-2 dentate or entire, veins in the lobes mostly furcate, supinnate in the base; sori approximate, costulae, the basal ones athyrioidal-curvate, the upper ones oval, indusium rather firm, eroso-ciliate.

(P. 293).

Japan.

Type has not yet been reported from China.

Var. *latisecta* Ros. Fedde Repert, 13, 126 (1914).

This variety has firmer texture, secondary pinnae obtusish, deeply pinnatifid and not pinnate, segments more close together, obtuse, with broader teeth; stipes smooth.

Yunnan.

43. *Athyrium yunnanense* Christ Bull. Geogr. Bot. Man. 134, (1907) Matthew 350, (1911).

Rhizomes oblique stipes few, clothed at base with ochraceous brown crisp subulate dense scales, otherwise entire plant glabrous -stipes slender, stramineous, 40 cm. long, sulcate, base 5 mm. thick. Fronds 50 cm. long, 25 cm. broad, deltoid-ovate, pinnae erecto-patent, remote, about 9 on each side under a caudate pinnatisect apex, the lowest ones scarcely abbreviate, not broaden downward, to 25 cm. long, 7-15 cm. broad, broad-oblong, acuminate-caudate, petiolate (petiole 1-4 cm. long), the upper costa narrowly winged; pinnules remote, petiolulate, ovate-caudate, the lowest ones often abbrebiate, to 8 cm. long, 3 cm. broad, about 12 on each side under a pinnatisect apex, cut down to a broad wing; lobes pectinate, close, parallel, separate by very narrow inter-stitial spaces, linear-lanceolate, 1 cm. or more long, 3 mm. broad, acute, acutely crenulate; sori numerous on lobes, 5-7 on each side of costule, oblique, close, extending from costule to the margin, lanceolate, the upper ones scarcely incurvated, 2 mm. long, the lower ones athyrioid, i. e. reniform-resupinate; indusium ovato-repend or reniform.

Yunnan, Kweichow.

44. *Athyrium umbrosum* (Ait.) Presl. Tent. 98, (1836); Christ 225; NPfl. 224; Matthew 350, (1911).

Polypodium umbrosum Ait., Hort. Kew 3. 466, 1789.
Asplenium umbrosum J. Sm., 1841, HEBK. 229.
Asplenium aitoni Moore, 1857.
Tichtaria caudata Cav., 1801.

Stipes 30 cm. or more long, strong, erect, brownish, clothed below with dark scales. Fronds 1-1.66 m. long, 30-50 cm. broad; pinnae ovate-lanceolate, 30-50 cm. long, 7.5=15 cm. broad; pinnules lanceolate, close, cut down to the rachis into numerous unequal-sided elliptical-rhomboidal lobes 1-1.3 cm. long, 4 mm. broad, which are deeply inciso-crenate; texture herbaceous; color bright green; veins pinnate; sori close, copious, oblong; indusium large, termid, emebraneous.

Australia, New Zealand, Madeira, Cavarier, Azores, Himalayas, Ceylon, Java, China: Kweichow.

45. *Athyrium alatum* Christ, Bull. Boiss. 6. 963, (1898); Matthew 348 (1911).

Ample; rhizomes;....; stipes 45 cm. long, firm, black, base provided with few long subulate scales, the upper part stramineous, thick as a raven's quill. Leaves deltoid, 50 cm. long, 30 cm. broad, bipinnate; pinnae very far apart (with interspace 9 cm. broad), the lower and middle ones long-petiolate, the uppermost ones sessile, the lowest ones 25 cm. long, 12 cm. broad, deltoid-ovate, acuminate; the lower pinnules remote, the upper close, the tertiary lobes sessile, cut into a narrow wing along rachis, oblong, obtuse, margin crenate-toothed, scarcely 1 cm. long, 3 mm. broad; sori small, oblong rather straight, 5 on each side of the lobe; indusium thin, pale; plant naked, texture papery, shinning green.

Yunnan, Kweichow.

46. Athyrium atkinsoni Bedd. Ferns. Brit. Ind. Suppl. 11, t. 359; Matthew 348, (1911).

Athyrium monticola Ros., Fedde Repert. 13: 123, 1913.

Stipes 15-30 cm. long, erect, straw-coloured, furnished towards the base with a few long narrow pale-coloured scales. Fronds 25-30 cm. long, triangular, 25-30 cm. broad at basal pinnae, gradually narrowed upward; tripinnate with the tertiary pinnae deeply pinnatifid; pinnae 7-8 pairs, the lowest much the largest, about 7.5 cm. broad; second pinnae with the rachis winged, but the pinnules (tertiary pinnae) often ([illegible]) distinctly petioled at least in the lower portion of the pinnae, pinnatifid ½-2/3 way down, the segments more or less crenate; sori one to each segment on the basal vein, linear, curved or almost reniform, never doubled indusium very small, cystopteroid; veins terminating just within the margin; texture herbaceous, naked.

India, China: Yunnan.

Var. andersoni (Clarke) C. Chr. Medd. Göt. Bot. Trädg. I. 78, (1924).

Asplenium andersoni Clarke, Journ. Linn. Soc. 15: 154, 1876.
Asplenium antkinsoni Bedd. var. andersoni Clarke, Ferns N. Ind. 487, t. 57, 1880.
Asplenium lastreoides Baker, JoB. XXVI. 227. 1888.
Athyrium lastreoides Diels, NPfl. 224; 1899; C. Chr. Ind. 143. 1905; Matthew 349. 1911.

Differs from the type in being 4-pinnate to 5-pinnatifid and by the rachises of second order being more or less flexuose; indusium very small, often not found.

N. India, Korea, China: Kweichow, Szechwan - Omei shan.

47. Athyrium crenatum (Sommerf.) Rupr. Nyland. Spicil. pl.
Fenn. 2, 14, (1844); Christ 225; NPfl. 224; Matthew
348, (1911).

Aspidium crenatum Sommerf., Vet. Ak. Handl. 1834, 104,
1835.

Asplenium crenatum Franch., 1845; Mett. n. 232; HKBk.
224.

Aspidium sibiricum Turcz., 1834.

Stipes 15-30 cm. long, scattered, firm, erect, naked, straw-colored, clothed towards the base with large ovate-dark-brown scales. Fronds 25-38 cm. each way, deltoid, tri- or quadripinnatifid, with 9-12 pinnae on each side, the lowest much the largest, 15-23 cm. long, 3.7-5 cm. broad; pinnules lanceolate, cut down to the rachis except towards the point on each side into 4-6 blunt oblong segments 4 mm. long, 2 mm. broad, which are bluntly toothed; texture herbaceous; rachis straw-coloured, both surfaces hairy or nearly naked; sori 2-6 to
(P. 295.)
a segment, oblong, usually nearly straight, often double.

N. Europe, Siberia, Japan, China: Shensi, Manchuria, Chihli.

48. Athyrium spinulosum (Maxim.) Milde, Bot. Zeit. 376, (1866);
Christ 225, NPfl. 224; Matthew 330, (1911).

Cystopteris spinulosum Maxim. Mem. Acad. St. Petersb.
9, 340, 1859.

Asplenium spinulosum Baker, 1867, HKBK. 225.
Athyrium hookerianum Moore, 1860.
Asplenium subtriangulare Hk., 1867, HKBk. 225.
Athyrium subtriangulare Bedd., 1868.

Stipes 15-30 cm. long, scattered, firm, erect, naked, straw-coloured, more or less clothed throughout with lanceolate pale-brown scales. Fronds 23-30 cm. each way, deltoid, tri- or quadripinnatifid, with 9-12 pinnae on each side, the lowest much the largest, 15-23 cm. long, 6.3-7.25 cm. broad, ovate-lanceolate; pinnule lanceolate, cut down to the rachis on each side into 4-9 oblong-rhomboidal mucronate down to the rachis on each side into 4-8 oblong-rhomboidal mucronate segments (4 mm. long, 2 mm. broad, which are sharply toothed; texture herbaceous; rachis firm, naked, or nearly so; sori 2-10 to a segment, usually rounded and the indusium ovate, but occasionally oblong, slightly curved.

Himalayas, Japan, Korea, China: Yunnan, Shensi, Manchuria, Szechwan.

49. Athyrium sphaeropteroides (Baker) C. Chr. Medd. Göt.
Bot. Trädg. 1. 77, (1924).

Polypodium sphaeropteroides Baker, Kew. Bull. 55, 1898.

Dryopteris sphaeropteroides C. Chr., Ind. 293, 1805; Matthew 367, 1911.

Phegopteris sphaeropteroides Christ, 1905.

Stipes elongate, stramineous, scaly or naked, paleae deflexed, ovate, brown, membranaceous; fronds large, deltoid, decomposite, green, submembranaceous, both sides pubescent when young, calvous when old, 1.6-2.33 long, rachis stramineous, pinnae and pinnules oblong-lanceolate, ultimate segments oblique, oblong, obtuse, erecto-patent, veins in ultimate segments forked or subpinnate, sori small, globose, superficial, placed on ultimate segments, subpinnate, sori small, globose, superficial, placed on ultimate segments, mostly solitary, lower pinnae 37-45 cm. long, 12.5-15 cm. broad, pinnules 3-3.5 cm. broad, ultimate segments 1 mm. broad. Sori very small, apparently exindusiate.

A large finely-cut plant, allied to *D. crenata* (Wall.).

Kweichow, Yunnan, Szechwan - Omei Shan.

In cutting and size this species scarcely differs from A. atkinsoni, from which it is separated by its opposite pinnae and especially by the presence in intestiniform, thin pale hairs scattered over the ribs beneath.

50. *Athyrium fargesii* Christ, Bull. Soc. Fr. 52 mem. 1. 49, (1905); Matthew 348, (1911).

Stipes 25 cm. long, strong naked, rufo-stramineous. Fronds 4- or 5-pinnatifid, 40 cm. long and equally broad, acuminate; pinnae petiolate, far apart, the lower ones much more widely separate than the upper ones with interstices 7 cm. apart, 20 cm. or more long, 10 cm. broad, ovate-acuminate; pinnules remote, petiolulate, 7 cm. long, ovate-oblong, the tertiary pinnules petiolulate, rather far apart, oblong-
(P. 296.)
acuminate, 2 cm. long, pinnate; the segments of 4 th order sessile, lanceolate, obtuse, acutely dentate, or even obtusely crenate-incised, 2/3 cm. long, 2½ cm. broad; sori densely crowded, rounded, brown, confluent exindusiate; texture thin; color obscure green.

Szechwan, Yunnan.

A large 4-pinnatifid fern with apparently exindusiate and subdimorphic leaves. Very near the *A. atkinsoni* Bedd.

51. *Athyrium cavalerianum* Christ, Bull. Geogr. Bot. Man. (1909), Mem. XI. 174; Matthew 348, (1911).

Ample, tripinnate; the upper pinnae opposite, the lower ones much remote, 13 cm. apart, 32 cm. long 12 cm. broad, petiolate, acuminate, pinnules very shortly petiolulate, patent, about 20 on each side, broadly lanceolate from base, acuminate, 6½ cm. long, 1½ cm. broad, close, cut down to a narrow wing, segments imbricato-close, about 20 on each side, rhomboidal-obtuse, 8 mm. long, 3 mm. broad, very shortly dentate, veins pinnate in segments, simple, 5 on each side; sori placed at the base of costules of veinlets, minute, rounded, ochraceous, indusium minute, lateral, but often irregularly lacerate more cystopteroid or woodsioid; plants glabrous, texture herbaceous, color obscurely green.

Kweichow.

52. Athyrium fimbriatum (Wall.) Moore, Ind. 185, (1860); NPfl. 224; Matthew 349, (1911).

Aspidium fimbriatum Wall, 1828.
Asplenium fimbriatum HK., 1860, HKBK. 229; HK. Sp. 3. 234, 1860.
Athyrium andersoni Clarke, 1876.
Davallia athyriifolia Baker, 1891.

Stipes 30 cm. or more long, erect, clothed below dark-brown scales. Fronds 2/3-1.33m. long, 30-53 cm. broad; lower pinnae 15-30 cm. long, 5-7.5 cm. broad; pinnules lanceolate; segments subdeltoid, distinctly stalked, deeply and sharply incised-pinnatifid, with mucronate teeth; texture herbaceous but firm; rachis strong, naked; sori close, copious, broadly oblong; indusium oblong or subreniform, convex.

Himalayas, China: Yunnan, Kweichow.

Var. membranacea Ros. Fedde, Repert. 13, 124, (1914).

Stipes and rachis slender, texture membranaceous, lamina larger, about 10-20 cm. long including the stipe, sometimes to 60 cm. long or longer and 18 cm. broad, pinnules profoundly incised (cut over the middle).

Kweichow: Pin-fa.

54. Diplazium Swartz, Schrad. Journ. 1800^{2}. 61. (1901).

Type: Asplenium plantaginifolium L.

Sori linear or linear-oblong straight or slightly curved, springing from the sides of the veins, more our less oblique to the costa, the lower vein of each group mostly, the higher ones rarely, bearing 2 sori i. e. with a sorus on each side; indusium single or double (according to the sori), the single ones opening towards costa or the costule or the costule- or ultimate segments, the double ones in opposite directions.

(p. 297).
Fronds simple or divided; veins pinnate or forked, veinlets free, sporangiferous. Rhizomes creeping or erect, the scales finely cancellate, with the areolae mostly dark-coloured, i. e. the cells with the side cells thin, the lumina mostly dark-coloured; stipes not articulate to rhizome with 2 free more or less flattened fibro-vascular bundles which mostly unit towards the lamina into a single diachous one. (Greek "diplazo" to be double alluding to the double indusia or involucres).

Sp. about 290, mostly in tropical and subtropical regions, about 13 are recorded in China.

This genus closely resembles Asplenium, differs chiefly in some of the sori being double, i. e. one on each side of the vein of the group, each furnished with a linear inducium the one opening interior the other exteriorly.

Arrangement of Sections

§ Eudiplazium. Veins free, Diels in NPfl. fig. 121, A-D.
§2. Anisogonium. Veins anastomosing, Bedd. Handb. Ind. Ferns. fig. 92-94.

Key to species

Veins free (§ Eudiplazium)
1. Fronds simple, margin entire, crenate or toothed towards apex............................1. D. lanceum
1. Fronds pinnatifid, at best pinnate at the very base.
   2. Plants glabrous, of the habit of D. lanceum, texture subcoriaceous ....2. D. zelanicum
   2. Plants scaly not of the habit of D. lanceum; texture thin herbaceous.................3. D. grammitoides
1. Frond simply pinnate or 2-pinnatifid, the lowest pinnae sometimes pinnate at base.
   2. Terminal pinna free, almost similar to the lateral ones.
      3. Margin of the pinnae lobato-crenate...4. D. macrophyllum
      3. Margin of the pinnae entire or at best undulate or serrate towards apex.
         4. Pinnae to 157 cm. long, 5 cm. broad...................................5. D. tabacium
         4. Pinnae below 10 cm. long, much narrower...................................6. D. bantamense
   2. Terminal pinna usually pinnatifid, unlike the lateral ones.
      3. Pinnae entire, crenate, serrate, toothed or slightly lobed, the lowest sometimes lobed 1/3 way down.

4. Pinnae only shallowly crenate, or serrate or subentire.
5. Under side densely scaly on the veins.............................7. D. pullingeri
5. Under side glabrous.
6. Fronds scarcely narrowed down ward; sori rarely diplazioid...8. P. pellucidum
6. Fronds decidedly narrowed down ward; sori often diplazioid...9. D. parallelosorm
4. Pinnae lobed to 1/3 way down, seldom deeper.
5. Pinnae prominently auricled on the upper side and cuneate on the lower side at the base
6. Stipes distant, slightly scaly at base.........................10. D. wichurae
6. Stipes tufted, densely scaly near the base..............11. D. longifolium
5. Pinnae equal or hardly auriculate at the base.
(P. 298).
6. Pinnae truncate and broadened at the base.
7. Soriferous veinlets deeply impressed on the upper side of the pinnae.....................12. D. esculentum
7. Soriferous veinlets not impressed above..............13. D. hirtipes.
6. Pinnae more or less truncate, but not broadened at the base.
7. Stipes thin scaly; pinnae 5 cm. broad.....................14. D. megaphyllum
7. Stipes glabrous or at best slightly scaly at base; pinnae below 2 cm. broad.
8. Base of pinnae narrowed suddenly on both sides; texture of hard, harsh feeling........15. D. silvaticum
8. Base of pinnae not narrowed; texture soft herbaceous.16. D. cavalieri
3. Pinnae more deeply lobed, often to 2-3/4 way down or more to the costa.
4. Texture more or less herbaceous to papyraceous.
5. Rachis more or less scaly or hairy.
6. Pinnae 2-3½ cm. long; stipes scaly or fibrillose throughout...17. D. grammitoides
6. Pinnae to 10 cm. or more long; stipes villose or tomentose; surfaces villose or short-hairy......18. D. petersenii
6. Pinnae 10-18 cm. long; stipes densely fibrillose below; surfaces naked.............................19. D. sorzogonense

5. Rachis naked.

6. Frond subdeltoid, 30 cm. broad, lower pinnae the largest, to 5 cm. broad, entirely glabrous......20. D. decurrenti-alatum

6. Frond ovate-lanceolate, to 15 cm. broad, lower pinnae slightly shorter than the upper ones, to 2.5 cm. long, one or both surfaces slightly hairy...............................21. D. japonicum

4. Texture subcoriaceous to coriaceous.

5. Pinnae sessile, auricled on the superior base, cut down to the costa below.............................22. D. [illegible]

5. Petioles of pinnae 2-3 mm. long; equal and truncate at the base; pubescent on the costa beneath...........23. D. mettenianum

5. Petioles of pinnae to 1 cm. long; auricled on the upper side at the base, glabrous on the costa beneath...24. D. platyphyllum

1. Fronds copiously 2-pinnate to tripinnatifid, rarely 4-pinnatifid.

2. Pinnules crenate or lobed at base ⅓ way down to the costa.

3. Pinnules usually adnate, entire or crenate towards apex; sori linear above 6 mm. long.

4. Pinnae acute, entire or subentire..................................25. D. matthewii

4. Pinnae acuminate, broadly crenate...................................26. D. veitchii

3. Pinnules not adnate, but free, more deeply lobed; sori shorter, broader.

4. Pinnules broadened, truncato-cordate at base; soriferous veinlets deeply impressed on the upper side ....12. D. esculentum

(P. 299).4. Pinnules not broadened, subtruncate at base; soriferous veinlets not impressed...................................28. D. [illegible]

2. Pinnules pinnatifid at least ½ way down to the costa.

3. Main rachis more or less asperous, muricate or aculeate.....................29. D. aspera

3. Main rachis clothed with scattered black lanceolate scales.........30. D. squamigerum

3. Main rachis usually glabrous.

4. Fully developed fronds under 50 cm. long.

5. Texture thin or herbaceous.

6. Pinnules to 7 cm. long, 2½ cm. broad........................31. D. prolixum

6. Pinnules to 4 cm. long, below 1.5 cm. broad.

7. Stipes, rachis and secondary rachis ebeneous; sori extend to the margin. ....32. *D. deltoideum*
7. Stipes and rachis stramineous; sori not extend to the margin.
8. Pinnules cut down to narrowly winged rachis.........33. *D. chinense*
8. Pinnules not so deeply crenato-lobate........34. *D. virescens*
5. Texture coriaceous or subcoriaceous..
6. Ultimate segments 1.7 cm. long, 5 mm. broad ....35. *D. griffithii*
6. Ultimate segment above 2.4 cm. long, 9 mm. broad..............36. *D. maxicaule*
4. Fully grown fronds more than 50 cm. long.
5. Pinnae to 11 cm. long, 2 cm. broad...37. *D. flaccidum*
5. Pinnae to 30 cm. above 5 cm. broad.
6. Pinnules deeply pinnatifid into numerous oblong segments.....38. *D. polypodioides*
6. Pinnules more shallowly pinnatifid into fewer broad rounded segments..39. *D. leptophyllum*
5. Pinnae to 50 cm. or more long
6. Fronds 4-pinnatifid...40. *D. orientalis*
6. Fronds tripinnatifid.
7. Sori reaching the margin.....................................41. *D. calogramma*
7. Sori not reaching the margin.
8. Pinnules opposite, about 20 on each side...42. *D. viridissimum*
8. Pinnules alternate, fewer on each side.......43. *D. opacum*
Veins more or less anastomosing (Anisogonium); frond simply pinnate.................................44. *D. ride*

1. *Diplazium lanceum* (Thunb.) Presl. Tent. 113, (1836); Christ 215; Hpfl. 225; Matthew 357, (1911).

Asplenium lanceum Thunb. 1784; FBK. 229.
Asplenium subsinuatum Wall., 1827.
Scolopendrium dubium Don, 1825.
Athyrium lanceum Milde, 1858.

Rhizomes wide creeping, wiry, acid brown, scaly; stipes scattered wiry, paleaceous, 10-25 cm. long, slightly fibrillose; fronds 15-25 cm. long, 1.5-2 cm. broad, attenuated gradually upwards and downwards, the edge entire or slightly undulated; texture coriaceous; veins pinnate, all reaching the margin, free; sori linear, irregular, reaching nearly to the edge, but not to the margin.

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Himalaya, Ceylon, Formosa, Korea, Japan, China: Kwangtung, Kiukiang, Hupeh, Fukien, Anhwei, Hongchow, Szechwan.

2. Diplazium zelanicum (Hooker) Moore Ind. 340 (1862). Christ 216; H.Fl. 225, Matthew 358, (1911).

Asplenium zelanicum Hook., Sp. 3. 237, 1860; 2 Cent. t. 16; HKBK. 230.
Athyrium zelanicum Milde, 1870.
Diplazium pinnatifidum Bee, 1865, (non Kze. 1839.).

Stipes scattered, 10-20 cm. long, firm, erect, scaly throughout; fronds 15-30 cm. long, 2.5-5 cm. broad, linear-lanceolate, acuminate, the apex slightly lobed, the lower two-thirds more deeply around the base cut down to the rachis; lobes blunt, 6-12 mm. across; texture herbaceous; veins pinnate; sori linear, 4-8 mm. long.

Ceylon, Hongkong, China: Kwangtung, Fukien.

A specimen from Yenping, Fukien according to Dr. Copeland only differs from Ceylong plant in the sinuses not dilated toward rachis and annules has 13-17 cells, while in Ceylong plant according to [illegible] it has 20 cells.

3. Diplazium grammitoides Presl. Epim. 84 (1849).

Asplenium grammitoides HK., Sp. III. 228; Ic. Pl. t. 917; 1854; Matt. n. 206 c.; HKBK. 491.
Athyrium grammitoides Milde, 1870.
Asplenium brachypodum Baker, Syn. Fil. 490 (1874).
Asplenium Koppinianum Copel., in Perkins Fragmenta 184 (1905).
Athyrium nanum Christ in Phil. Journ. Sci. 2 Bot. 161 (1907).

Rhizome wide-creeping; scales copious, lanceolate, brown, membranous; stipes gray-stramineous, 7.5-10 c. long, scaly throughout; fronds lanceolate, 12-24 cm. long, 1.5-3 cm. bipinnatifid; rachis stramineous, copiously scaly, winged in upper half; lower pinnae distant, free, subpetiolate, lanceolate, 1.5-2.5 cm. long, 6-10 mm. broad, much reduced on lower side, cut down to a broad wing into close oblong subentire lobes, lowest anterior largest; texture moderately firm, rachis below rather scaly; veins pinnate in lower lobes; sori oblong, borne in a row on either side close midrib of pinnae.

Philippines, China: Fukien, Chekiang.

A decidedly variable little species but clearly distinct from all other species of the group except D. japonicum, from which it differs in much smaller size, lanceolate fronds not more than 3 cm. broad and scaly stipes, rachis and costa.

4. Diplazium macrophyllum, Ching, Sinensia 1: 6 (1929).

Rhizome thick, short, woody, erect, palea dense, imbricate-linear-lanceolate to linear-subulate, 1.5-2 cm. long, with long hair-pointed frizzy apices, often 2 cleft, blackish, ciliate. Stipes strong, 5085 cm. long, about 1 cm. thick, dark brown, and paleaceous near the base, greenish upward, turning dark stramineous upon drying; broadly channelled above, paleae similar to the rhizomatic ones, sparce on the basal part of the stipe, glabrous upward. Fronds ample, 49-60 cm. long, 20-26 cm. broad, simple pinnate, broadly oblong, slightly abbreviate towards base, glabrous on both surfaces, texture herbaceous, moderately firm, glossy green above, paler below (when living). Pinnae 7-9 on each side below a broad and shallowly pinnatifid acuminate apex, 2-3 cm. apart, oblong-lanceolate, petiolate (petiole -5 mm. long), the uppermost ones adnate, 17-19 cm. long, 3-4 cm. broad, base subturncate to
(P. 301).
subrotund, apex acuminate, margin remotely lobato-crenate into broad rounded short lobes; midrib prominent, lateral veins spreading-patent, about 7 mm. apart, veinlets 5-6-jugate, free, very ascending. Sori dense more or less confluent as last, oblong, 5-7 mm. long, following the lower ~~-24~~ 2-4 veinlets of the group, considerably short from the margin, induceium broad, spurious.

Kwangsi.

A large coarse tufted fern with ample fronds from a short thick woody caudex, closely allied to D. megaphyllum Baker, differs by petiolate pinnae with broadly crenate margin and broader induceum.

5. Diplazium bantamense Blume, 191, (1828); Christ 216; N. fl. 226; Matthew 357, (1911).

Athyrium bantamense Milde, 1870.
Asplenium bantamense Baker, 1867, FKBK. 231.
Diplazium alternifolium Blume, 1828.

Stipes 15-30 cm. long, firm, erect, nearly naked; fronds 23-45 cm. long, with lower half pinnate, the terminal pinnae large and one to 4 pairs of lateral ones, which are 15-20 cm. long, 2.5-3.7 cm. broad, both ends narrowed, the edge very nearly entire, or obscurely undulate; texture coriaceous; veins 3-5 to a group; sori slender, irregular, nearly touching both edge and midrib.

Himalayas, Malaccas, Borneo, Amboteum, Formosa, Hongkong, China: Yunnan, Kwangtung.

Diplazium alternifolium (Bl.) is form with broader pinnae and rounded base.

6. Diplazium tabacium Copel. Phil. Jour. Sci. I. Suppl. II. 149 t. 6, (1906).

Athyrium tabacium Copel., 1908.

Rhizome erect, 8 mm. thick paleae brown, lanceolato-subulate, 8 mm. long; stipes 30-40 cm. long, 3-4 m. thick, channelled above, sparcely paleaceous below, and so is the rachis, petioles and costa-of pinnae; fronds 30-40 cm. long, ovate, pinnate, after proliferous on the superior tip; pinnae 2-4 pairs lanceolate-ovate, falcato-acuminate, serrate towards apex, base cuneate-truncate, not auriculate, the lower ones much the largest, 15 cm. long, 5 cm. broad, subcoriaceous, glabrous; veins 3 or 4, forked; sori linear, extending from the costa almost to the margin.

Philippine, Hainan (McClure, 1921)

New to China.

7. Diplazium pulligeri (Baker) J. Sm. in Ferns Brit. and For. ed. II. 315 (1877); C. Chr. Ind. 238 (1906); Matthew in Journ. Linn. Soc. 39: 358 (1911).

Asplenium pulligeri Baker, Gard. Chron. n. s. 4: 484 (1875).

Asplenium bireme Wright, Kew Bull. (1908) 182.

Asplenium chlorophyllum Baker, Journ. Bot. (1885) 104; Bedd. Handb. Suppl. 39 (1892).

Caudex rather thick, oblique; scales none or very small and obscure; stipes densely tufted (3-5-together), 12-17 cm. long, sorbid clackish at the base, growing greenish upward densely clothed like the entire main rachis with shaggy rather stiff, brown glandular hairs; frond 20/-38 cm. long, 12-15 cm. broad at the middle, which is the broadest part, ovate-oblong, narrowed very gradnally towards the apex and reduced towards the base, stiply pinnate, rachis densely pilose; pinnae 20-25 on each side, alternate, moderately close; lanceolate, acuminate, crenate, the lower ones sessile, the middle ones adnate,

(P. 302).

the upper most ones connected by a broad wing under the pinnatifid acuminate apex, those in the upper half of the frond horizontally patent, the basal ones strongly deflexed, the largest to 7 cm. long, 1.5 cm. broad, distinctly auricled on the upper side at the base, rounded or slightly cut away below; veins distinct to the margin; transluscent, forked once or twice, but pinnate in the auricles; sori linear, borne on the anterior veinlets and extending from the costa to more than half way to the margin, slightly curved, about 5 mm. long, rarely diplazioid, indusium moderately broad, persistent, not ciliate; texture thin papery, bright green and rather densely villose on both surfaces, and especially along the costae beneath.

Kwangtung, Formosa, Penang.

A medium-sized and very-distinct fern, characterized by all parts being densely villose and rarely diplazioid sori. Baker's diagnosis for his Asplenium pullingeri was evidently based upon a rather smaller plant then grown in Kew Gardens perhaps from the root stocks sent to that institution by Mr. Pullinger from Hongkong in 1871. His statemen "its very short stipes" is certainly incorrect, as the specimens collected in Tai-mo-shan, New Territory, where much be the type locality for Baker's species, by E. H. Wilson and W. J. Tutcher, upon which Wright base the description for his Asplenium bireme has stipes to 30 cm. long, and Matthew's plant, No. 280 (February 4th, 1907), from Ma-on-shan in the same locality, upon which our present figure is based has stipes from 12-17 cm. long.

8. *Diplazium pellucidum* Ching, Sinensia 1: 7 (1929).

Rhizome short thick, obliquely erect; paleae stipes densely tufted, clad rather sparcely in membranaceous brown subulate ciliate spreading scales, 20-25 cm. long, dark brown on the lower half, dull stramineous upward, deeply channelled above. Fronds oblong-ovate, 30-32 cm. long, 17-20 cm. broad in the middle, which is much the broadest, slightly abbreviate towards base, simple pinnate, rachis stramineous, scaly. Pinnae 10-12 pairs under a broad pinnatifid acuminate apex, the middle ones 9-11 cm. long, 1.6-1.8 cm. broad near the base, lanceolate, subhorizontally patent, the basal ones shorter (8-9 cm.) and as broad, only slightly deflexed, alternate, rather approximate, the lower ones sessile, the upper ones broadly adnate, subtruncate or rounded at base, more or less dilated on both sides, apex acuminate, remotely and rather irregularly crenate below the middle, but distinctly and regularly serrate towards apex, costa slender, lateral veins translucent, distinct free, 4-5 apart, 2-jugate, except the basal pair which is mostly 3-jugate, very ascending, extending to the margin; texture thin, pellucido-charactaceous; lustrous light green above, paler below (when living) Sori linear, 3-5 mm. long, slightly curved, oblique, following the upper veinlet of the group, placed midway between costa and margin, very rarely diplazioid, indusium moderate broad, persistent.

Kwangsi.

So far as is the writer aware, the only known Chinese species comparable to the present one is D. pullingeri Baker, from which it can, however, be easily distinguished by much fewer, larger, and serrated pinnae with a more or less dilated base, longer scaly stipes and much less strongly deflexed lower pinnae.

9. *Diplazium parallelosorum* (Baker) C. Chr. Ind. Suppl. 27, (1913).

Asplenium parallelosorum Baker, Kew Bull. 9, (1906); Matthew 342, (1911).

Caudex erect, paleae linear, very dense, dark-brown, large, membranaceous; stipes erect, 7.5-10 cm. long, paleaceous; lamina oblong-lanceolate, attenuate towards the base, 30-37 cm. long, 15-17 cm. broad in the middle, membranaceous, green and glabrous; primary rachis paleaceous on the lower part, pinnae sessile, lanceolate profoundly crenate, the middle ones 7.5-8.7 cm. long, the lower ones 1.2-1.5 cm. broad; and gradually smaller downward; the lowest ones deflexed; veins pinnate; veinlets ascending, 2-3-jugate; sori linear, basal, uniseriate, between costa and margin; indusium narrow, membranaceous, glabrous, often diplazioid.

Yunnan.

10. *Diplazium wichurea* Diels, NPfl. 226, (1899).

Asplenium wichurae Mett., Ann. Lugd. Bot. 2. 237 (1866); HKBK. 233.

Rhizomes firm, wide-creeping; stipes 6-12 mm. apart, 15-30 cm. long, stramineous, slightly scaly at the base; fronds 30 cm. or more long, 15-23 cm. broad, with numerous pinnae on each side, the lower ones stalked, 7.5-10 cm. long, 1.2-1.8 cm. broad, the point acuminate, the edge double-teethed (crenate, each sometimes crenation again irregularly-serrate) lobed, auricled near the base on the upper side, obliquely truncate on the lower side; texture coriaceous or sometimes herbaceous; veins pinnate in the lobes; sori falling considerably short from the edge.

Japan, Formosa, Korea, China: Kweichow, Yunnan, Szechwan, Kiangsi, Chekiang - Yung-tan Shan; Anwhei.

11. *Diplazium longifolium* (Don.) Moore, 1859; NPfl. 226.

Athyrium longifolium Milde, 1870.
Aspidium longifolium Don., Prod. Fl. Nepal, 7, 1825; HKBK. 234. (non Schrad. 1824).

Stipes 15-23 cm. long, slender, erect, scaly below; fronds 30-45 cm. long 10-15 cm. broad, the apex pinnatifid, below this 12-18 pairs of falcate pinnae, the lower ones stalked, 5-7.5 cm. long, 1.3 cm. broad, the point acuminate, the edge lobed, and the lobes sharply and finely serrated, the two sides unequal, the upper distinctly auricled, and the lower obliquely truncate at the base; texture herbaceous;

veins fine, 6 or more in a group; sori falling considerably short of the edge.

Himalayas, China: Kweichow, Szechwan, Yunan.

12. *Diplazium esculentum* (Retz.) Sw. Schrad. Journ. 1801^{2}. 312, (1803); C. Chr. 222; NPfl. 228; Matthew 357, (1911).

Hemionnitis esculentum Retz., Obs. 6. 38. 1791.
Anisogonium esculentum Milde, 1836.
Asplenium esculentum Presl., 1825, HKBK. 244.
Altipteris esculentum J. Sm., 1851.
Athyrium esculentum Milde, 1871.
Diplazium pubesceus, Link, 1833.

Caudex subarborescent, erect; stipes 30-60 cm. long, strong stramineous, angular, deeply grooved, erect, tufted; fronds 1.33-2 mm. long, occasionally simply pinnate only, but usually bipinnate; lower pinnae 30-45 cm. long, 15-20 cm. broad, pinnules 7.5-15 cm. long, 1.8-2.5 cm. broad, the apex acuminate, the edge more or less deeply-lobed or erosely crenate, broadest at the base, which is truncate, and often auricled; texture subcoriaceous; rachis deeply grooved above, often pubescent, or glabrous; veins fine, copiously pinnated, 6-10 on each side in each lobe with a distinct barren central midrib, the veinlets (P. 304).
of the different groups beginning to unite a short distance from the midrib, with lines of sori often on all the lateral veins.

Himalayas to Ceylon, Philippines, Formosa, Loochoo, Malaya, Hongkong, China: Kwangtung, Hainan, Anhwei, Chekiang Yunnan, Hunan.

A species very variable in cutting, in the mountains around the West Lake, Hong~~ko~~chow, I have seen some plants with simple pinnate fronds with broad deltoid-lanceolate pinnae some plants with bipinnatifid fronds or bipinnate in the lower part, and still others with perfect bipinnate fronds of much larger dimensions; sometimes the three forms may spring from the same rhizome. It is of a very herbaceous textuer, growing along exposed stream side.

13. *Diplazium hirtipes* Christ, Bull. Boiss. 7. 11. (1899); Matthew 357, (1911).

Stipes to 10 cm. long quite slender, but much thickened at base, pale coloured, covered with dense patent soft hairs or with reflexed stout scaly black setae 1 cm. long, which extending to rachis, thus giving the plant a dark dusty looking. Fronds 40 cm. long, 18 cm. broad, ovate, contracted towards base by the gradual diminution in size of

the lower pinnae, with a broadly pinnatifid apex. The lower pinnae-small, the middle ones to 10 cm. long, about 20 on each side of the rachis, 20 cm. broad at the base of lamina, moderately close, lanceolate, caudato-acuminate, pinnatifid into entire regular semi-rotund lobes with sharp sinuses, but less deeply and more sharply toothed near the apex, lobes not cut 1/3 way down the base of pinnae enlarged, equal, almost sessile; texture herbaceous opaque, surfaces naked, quite dark green, veins pinnate in the lobes; sori from the costa, one only to each group of veins in a lobe, but not reaching to the lobes, very oblique, 3 mm. broad, narrowly linear, brown, inducium excuscent, narrow, hardly visible, dark gray, not diplazioid.

Yunnan, Hunan.

14. *Diplazium megaphyllum* (Baker) Christ, Bull. Boiss. 6. 961, (1898); Matthew 358, (1911).

Asplenium emegaphyllum Baker, JoB. 264, 1890.

Stipes 4.5 cm. long, thinly pubescent throughout; paleae linear, dark brown; fronds oblong, simple pinnate, 60-75 cm. long, 30 cm. broad, moderately firm in texture, green an glabrous on both surfaces, rachis brown; pinnae lanceolate, subsessile, the largest 20-23 cm. long, 5 cm. broad, with shallow rounded lobes and a subtruncate base, veins pinnate, opposite the lobes; veinlets 5-6-jugate, very ascending; sori narrow, beginning at the base of the veinlets; inducium narrow, glabrous.

Near Asplenium celtidifolium Kungze.

Tonkon, China: Kweichow, Yunnan.

15. *Diplazium silvaticum* (Bory) Sw. Syn. 92, (1806); Christ 217; NPfl. 225; Matthew 358, (1911).

Callipteris silvaticum Bory., Voy. I. 282, 1804.
Asplenium silvaticum Presl., 1825; HKBK. 232.
Diplazium elatum Fee, 1850-52
Diplazium acuminatum Presl. 1836.

Caudex decumbent; stipes 30 cm. long, firm, erect, brownish, naked, scaly at the base; fronds 30-60 cm. long, 10-20 cm. broad, ovate-lanceolate, with numerous spreading pinnae, the largest 7.5-10 cm. long 1.2-1.8 cm. broad, the apex acuminate, the edge broadly lobed to a~~nd~~ depth of 1-2 mm. and the base narrowed suddenly on both sides; texture thin, herbaceous; rachis firm erect, naked, veins fine, pinnate in the

(P. 305).

lobes, 5-7 to a group, sori in long slender lines reaching nearly to the edge.

Widely dispersed overy the tropical countries in Asia: Formosa, Hongkong, China: Kwangtung, Fukien.

Habit of D. japonicum, the present species can be easily distinguished from its ally by thick harsh papery or subcoriaceous texture of shining fronds, distinctly stalked (the petioles in the lower pinnae 1 cm. or more long) lanceolate falcate pinnae which are cut only 1/3 or black basal part of stipes clothed in black scales.

16. Diplazium cavalieri Christ, Bull. Geogr. Bot. Man. 114, (1904); Matthew 357, (1911).

Very near Diplazium wichurae Mett., but differs in much longer fronds 34 cm. long; pinnae more widely separate; almostly equal at base (hardly auriculate on the anterior side and not cuneate on the posterior) stipes very long, 45 cm. long, slender, brownish-puple as the rachis; pinnae 12 on each side under the lobed apex; sori as in Diplazium wichurae.

Kweichow.

18. Diplazium petersenii (Kze.) Christ, Bull. Geogr. Bot. Man. 246, (1902); Matthew 358, (1911).

Asplenium lasiopteris Mett., 1856 HKBK. 235.
Asplenium tomentosum Mett., n. 209, 1858.
Diplazium lasiopteris Kze., 1843; Christ. 218; NPfl. 226.

Rhizomes wide spreading; stipes 15-23 cm. long, firm, erect, dark-colored, villose; fronds 38-45 cm. long, 15-20 cm. broad, with 8-10 pinnae on each side below the pinnatifid apex, the largest 7.5-10 cm. long; 2.5-3.7 cm. broad, the lower lobes cut down nearly or quite to the rachis-1-1.3 cm. deep, 10 mm. broad, the apex obtuse, the edge distinctly crenate; texture herbaceous, the dark-colored rachis and dark green frond villose on both sides; veinlets 5-6 on each side, simple; lower sori 3 mm. long.

Java, the Neilgherrees, China: Szechwan, Yunnan, Kweichow, Canton.

Closely related to D. japonicum and with which it has been not uncommonty confounded. The present species can be, however, distinguished from its relative by much broader fronds, much closer pinnae, more regular and longer sori and, particularly, by all parts, especially the rachis and costa, densely villose; pinnae are pinnatifid almost down to the rachis.

19. **Diplazium sorzogonense** Presl. Tent. 114, (1836).

Asplenium sorzogonense Presl, Rel. Haenk. I. 45, 1825; HKBK. 236.
Asplenium speciosum Mett., 1859; HKBK. 235.
Diplazium speciosum Bl., 1828; Christ 218; NPfl. 226.
Asplenium speciosum Mett., 1859; HKBK. 235.

Stipes tufted, 30 cm. or more long, firm, erect, straw-coloured or brownish, nearly naked; fronds 30-60 cm. long, 20-30 cm; broad, with 10-20 pairs of pinnae below the pinnatifid apex, much acuminate, the edge lobed, the lobes reaching down two thirds of the way to the rachis or more close 6 mm. broad, slightly toothed, the base truncate or slightly cuneate; texture herbaceous, but firm; rachis erect; naked; veins pinnate in the lobes; sori slender, reaching nearly to the edge.

Malayas, Philippines, Java, Hongkong.

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20. **Diplazium decurrenti-alatum** (Hooker) C. Chr. Suppl. I. 26; Bull. Geogr. Bot. Man. 70, (1911).

Gymnogramme decurrenti-alatum Hooker, Sp. 5. 142 t. 294 t. 294, (1864) HKBK. 377.
Leptogramma decurrenti-alata J. Sm., 1875.
Phegopteris decurrenti-alata Christ, Frank. Erd. 274, 1897.
Athyrium-decurrenti-alatum Cop., 1908.
Dryopteris decurrenti-alata C. Chr. Ind. 261. Cum syn. 1905.

Stipes 45 cm. long, slender, slightly scaly downward; fronds 45 cm. long, 30 cm. broad, subdeltoid; lower pinnae much the largest, lanceolate, 15 cm. long, 5 cm. broad, cut down to the rachis below into oblong blunt lobed pinnules; texture herbaceous; colour deep green; rachis and both sides naked; veins pinnate in the lobes of the pinnules, with the sori near the main veins; indusium wanting.

21. **Diplazium japonicum** (Thunb.) Bedd. Ferns. Br. Ind. Suppl. 12, (1876); Christ 218; NPfl. 226; Matthew 357, (1911).

Asplenium japonicum Thunb., Fl. Jap. 334, 1784; HKBK. 234.
Asplenium schkuhrii HK., 1860.
Asplenium polyrhizon Baker, 1874, HKBK. 490.
Diplazium oldhami Christ, 1899.

Rhizomes slender, wide spreading; stipes 15-30 cm. long; slightly scaly towards the base (moderately scaly throughout in our specimens); fronds 23-38 cm. long, 10-15 cm. broad, ovate-lanceolate, with 8-10 rather distinct pinnae below the pinnatifid apex, the lower ones sessile, 7.5-10 cm. long, 1.8-2.5 cm. broad, cut down in the lower parts two-thirds of the way down to the rachis into close oblong slightly toothed

lobes 6 mm. broad; texture herbaceous, both surfaces bright green, nearly naked; rachis slender, straw-coloured, the lower lobes with sori on each reaching 2/3 the way to the edge, the lowest 3 mm. long, induclum broad, brown, tumid.

Japan, Formosa, Korea, Himalayas, China: Kwantung, Szechwan, Omei Shan; Kiangsu, Chekiang, Hunan, Kweichow

A decidely variable fern with its simpler-forms closely approaching D. grammitoides Presl, from which it differs by lanceolate-oblong frond and incised pinnae, while the later species has lanceolate frond and only the lower pinnae incised.

var. oldhami Baker, MKBK. 235; Matthew 357 (1911).

Differs from the type in its smaller frond, lanceolate, 10-15 cm. long, 5-7.5 cm. broad; rachis straw-coloured, polished, naked; pinnae 2.5-3.7 cm. long, blunt; lobes blunt, only 3 veins on each side of the costule.

Formosa, China: Shensi.

Var. nudisorum C. Chr. Medd. Gö. Bot. Trädg. 1. 78, (1924).

Sori are absolutely without indusium otherwise the plant is a true D. japonicum.

A similar but larger fern with more deeply ~~incised~~ closed pinnae and broader, toothed segments was collected in Hunan, by Handel-Mazzetti.

Szechwan, Hunan.

(P.307)
22. Diplazium epirachis Christ, Bull. Soc. Fr. 52 mem. 1. 52, (1905); Matthew 357, (1911).

Rhizomes erect, thick, fibrous-rooted, the base of stipes clad in dark-castaneous setaceous scales ½ cm. long, otherwise the entire plant glabrous. Stipes fasciculate, reddish-stramineous, 14 cm. long; fronds 30 cm. long, 10 cm. broad, ovate, scarcely attenuate toward the base, apex acuminate; pinnae 1 cm. broad, close, lanceolate subfalcate, acute, numerous, 25-30 on each side of the rachis under the pinnatifid apex, sessile, lobated, the lower ones towards base cut down to the costa, unequal, i. e. the upper base auriculately broadened; lobes about 15 on each side, rounded, 5 mm. broad, not deep minutely denticulate; veins pinnate in lobes, close, to 8 on each side of the costule; sori uniseriate following costa and costules, obliquely adpressed, 1 to each lobe, short, 2 mm. long, lanceolate brown scarcely curved; indusium inconspicuous, elongated; texture coriaceous, color light green above, the under surface pale green.

Kweichow.

23. Diplazium mettenianum (Miq.) C. Chr. Ind. 236, (1905).

Aspidium mettenian Miq., Ann. Ludg. Bot. 3. 174. 187.
Diplazium textori Makino, 1899.

Stipes 7.5-2.5 cm. apart, fronds 37-30 cm. long, 18.5-11.5 cm. broad near the base, deltoid-lanceolate, acuminate; texture subcoriaceous, pinnate under the pinnatifid apex; rachis glabrous, slender, convex below, angularly sulcate above; pinnae about 15-12 on each side, subconfert, opposite or alternate, patent, petiolate, the petioles in the lower pinnae about 2-3 mm. long, the upper ones subsessile, truncate at the base, lanceolate, acuminate, upper surface glabrous, dark-green, and conspicuously pubescent near the costa, deeply pinnatifid below the serrated long acuminate apex; segments unequal-lateral, flacate-ovate, obtuse or oblique, acutish, lightly serrulate or very entire. Veins about 6 on each side, usually forked, the upperforkings are soriferous; sori elliptic-oblong or elliptic, 5-2, usually 4, on each side, placed midway between the margin and costa.

Japan, China: Fukien, Kwangtung.

Most closely related to D. silvaticum from which it differs only thin papery texture not hard to feeling, somewhat broader (-2.5 cm.) and shorter -10 cm.), pinnae which are pinnatifid to half way down, and with more or less broadened and truncate base.

24. Diplazium platyphyllum Christ, Bull. Geogr. Bot. Man. 148, (1907); Matthew 358, (1911).

Rachis almost as thick as a goose's quill at base, teret, rather naked, entire plant reddish-brown; fronds 65 cm. long, 20 cm. broad at base, broadest at base, oblong-acuminate, pinnae, numerous, about 25 on each side, the lowerones remote, 7 cm. long apart, all (except the upper most) distinctly petiolate (petioles about 1 cm. long; slender), the lower ones 15 cm. long, base 1½ cm. broad, triangular-lanceolate, long caudate, base unequal, cuneate on the lower side, broadly auriculate on the upper, deeply lobed; lobes about 12 below the serrated apex, triangular-ovate (in the lowest ones) auriculate, 2 cm. long; 12 mm. broad, rather obtuse, coarsely and acutely serrate, sinuses acute, veins in lobes pinnate and forked; sori large, 1 cm. long, oblique, mostly singular and seated on the lower anterior, slightly curved; brown, extending almost to the margin, rarely in the auricles and generally in the inferior lobes, shorter, 4-5; indusium gray, thin, sori revolute, texture coriaceous; colour opaque flavescent.

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Kweichow.

25. *Diplazium matthewii* (Copel.) C. Chr. Ind. Suppl. 27, (1913).

Athyrium matthewii Copel., Phil. Journ. Sci. Bot. III. 278, (1908).

Rhizomes not seen, probably erect; stipes 35 cm. long, atratous, almost glabrous; fronds 60 cm. long, about 30 cm. broad, sub-bipinnate, apex shortly pinnatifid, glabrous, of herbaceous texture, pale green beneath; rachis obscurel coloured, glabrous; pinnae alternate, about 8 on each side, the longest ones 17 cm. long, 7 cm. broad, acute, pedicelled, the lower ones slightly shorter, the uppermost ones like Diplazium maximum (Don.) lobed, larger ones subpinnate; basal segments ovate, acute, 16 mm. broad, abruptly semi-truncate, adnate, entire or subcrenate; sori regular, parallel, costular, sometimes near margin, rather dense, diplazioides; segment adnato-coalescent, triangular-ovate veinlets free, the lower ones branched, extending to the sinuses.

Hongkong: New Territory Tai-mo Shan.

A species of the D. maximum group, well charactered by the very large and almost or quite entire segments and uniform parallel sori of most of the frond. The small pinnae below the apex are in fructification.

In habit this species is more closely allied to D. virtchii Christ from W. China rather than to D. maximum as the anthor suggested, both being much simple forms of the latter species. From D. virtchii it can be distinguished by much short, few-lobed acute apex, by shorter and acute or abruptly acuminate (not gradually acuminate) morepinnae, almost or quite entire margin and more copious sori even up to the terminal pinnae (above 10 sori on each side of costule of lower segments).

26. *Diplazium veitchii* Christ, Bull. Geogr. Bot. Man. 125, (1906); Matthew 358, (1911).

Rhizomes creeping, strongly nod~~o~~ucous, thick as a ~~r~~raven's quill, clothed with brown lanceolate, subulate scales ½ cm. long; stipes few, subsolitary, base dark-brown and scaly, covered upward with furfuraceous pale stramineous slender subulate, scalelets, scarcely 2 mm. in diameter, 23 cm. long; fronds 33 cm. long, 20 cm. ~~lon~~, broad, deltoid, acuminate, base not atten~~o~~uate, bipinnatifid and bipinnate in the lower part, pinnae free, about 7 on each side under the much prolonged lobato-pinnatifid apex 15 cm. long, the lower pinnae petiolate (petiole 10 mm. or more long), the upper ones subsessile, the uppermost ones decurrento-adnate, falcate, oblong, acuminate, base almost equal, slightly narrowed, subcordato-truncate, deeply lobato-pinnatifid and pinnate with free pinnules near the base 19 cm. long, 6 cm. broad, pinnules oblong-ovate, 2 cm. long, 1 cm. broad, round at base and apex lobes rounded decussate, the lowest about 2 cm. long, the upper ones

diminuate and crenulato-dentate; veins obliquely pinnate in lobes, 4 on each side, simple; sori extending from the costa to the middle of pinnae, oblique, brown, irregular, about 6 mm. long, or much shorter, 7-5 on each side of costule in the basal segments, fewer upward, and only 1 to each side in the uppermost lobes, indusium gray, fimbriate, very narrow, soon disappeared.

Szechwan: Kiating.

A unique species of the D. maximum group, characterized with a few large remote petiolate pinnuate to pinnatifid pinnae under the long deltoid deeply pinnatifid large apex.

(P. 369).
28. Diplazium maximum (Don.) C. Chr. Ind. 235, (1905); Matthew 236, (1911).

Asplenium maximum Don, 1824, HKBK. 239.
Asplenium alatum Hooker, 1860.
Diplazium alatum Blume, 1828.
Diplazium latifolium Don, 1825; HKBK. 239 (non Cav. 1893).
Asplenium sororium Mett., 1861.
Gymnogramme gigantea Baker, 1889.
Nephrodium giganteum Diels, 1900.

Caudex erect; stipes 60 cm. or more long, firm, erect, scaly only at the base; fronds 1-2 m. long, 2/3-1 m. broad, with numerous pinnae on each side, the lowest 23-45 cm. long, 10-30 cm. broad, with numerous distinct subsessile pinnules, 5-10 cm. long, 1.8 cm. broad, the edge more or less lobed, sometimes halfway down; texture herbaceous rachises and both sides nearly naked; veins pinnate in the lobes, 4-6 on a side; sori medial, the lowest 4 mm. long.

India to Ceylon, China: Hupeh.

Var. brevisora Ros. Fedde Repert. 13, 129, (1914).

This variety has larger pinnae, to 10 cm. long, 2½ cm. broad; sori medial, abbreviate, shortly linear or oval, remote from secondary costa, only occupying the lobes.

Kweichow: Pin-fa.

30. Diplazium squamigerum (Mett.) Hope, Ferns N. W. Ind. 259 t. 26; Christ, Bull. Soc. Fr. 52 Mem. I. 51. (1905); Matthew 358, (1911).

Asplenium squamigerum Mett., Ann. Lugd. 2. 239, 1837; HKBK. 237.

Stipes over 30 cm. or more long, straw-coloured, slender, with small scattered nearly black, lanceolate scales through-

out; fronds 30-38 cm. long, nearly as broad, deltoid; lower pinnae 15-23 cm. long, 5-6.2 cm. broad, pinnate except at the apex; pinnules 3.7 cm. long, 1.8 cm. broad, the point blunt, the edge broadly lobed, the lower lobes 6 mm. broad, entire; texture herbaceous; rachis slender, stramineous, chaffy below; veins subflabellate, the lower veinlets of the lobes with one or two lateral curved forkes on each side; sori linear, curved, falling far short of the edge, the lowest 4 mm. long.

India, Japan, China: Hupeh, Szechwan, Chekiang: Tien-mo Shan.

31. *Diplazium prolixum* Ros. Fedde Repert. 13, 126, (1914).

Rhizome creeping, about ½ cm. thick, covered at apex with paleae, which are blackish, lanceolate, 3 mm. long, 1 mm. broad; stipes black near the base, sparcely paleaceous, straw-yellow, naked, above, slender, about 30 cm. long, 1½ mm. thick; lamina deltoid-ovate, acuminate, bipinnato-pinnatifid or subpinnate below, herbaceous, glabrous, 35 cm. or more long, base as broad or broader; pinnae about 12 below the pinnatifid apex; petiolate (the petiole of basal pinnae about 3 cm. long) contiguous, the lower ones about 6 cm. distant and erect-patent (the others suberect), about 18 cm. long, 12 cm. broad, the lower ones scarcely shortened, unequal at base (the lower side about 1½ cm. shorter than the upper), linear-oblong, acuminate; pinnules about 10 on each side, unequal at base, linear, oblong acuminate, the lower ones petiolate, to 7 cm. long, 2½ cm. broad, very deeply pinnatifid or pinnate below; segment to 10 on each side, about 1½ cm. long, ½ cm. broad, oblique, oblong, acute, the lower ones below apex profoundly inciso-lobate, the upper ones serrate-dentate; veins to 5 on each side, simple, very oblique; sori 5-6 in middle lobes, often diplazioid in (P. 310). the lower ones, others linear, about 2 mm. long, inducium broad, thin membranaceous, very soft, margin erosed.

Kweichow: Gan-chuen and Pin-fa.

32. *Diplazium deltoideum* Presl. Tent. 114, (1836).

Athyrium deltoideum Milde, 1870.
Asplenium deltoideum Presl., 1825, Rel. Haenk. 1. 47 t. 7 f. 2; HKBK. 237.

Stipes 15 cm. long, slender, erect; ebeneous below; naked; fronds 30 cm. long, 10 cm. broad, deltoid, with a few distant pinnae on each side, the lowest ovate-deltoid, 12.5 cm. long, 5-7.5 cm. broad, cut down in the lower half into distinct stalked pinnules, 2.5-3.7 cm. long, 1.2 cm. broad, which are bluntly lobed below two-thirds of the way down; texture

herbaceous rachis naked, those of the pinnae ebeneous; veins pinnate in the lower lobes; sori reaching the edge.

Luzon, South China: Hainan (McClure 1921).

33. *Diplazium chinense* (Baker) C. Chr. Ind. 229, (1905); Matthew 357, (1911).

Asplenium chinense Baker, 1867, HKBK. 237.

Stiptes 30 cm. long, slender, greyish, nearly naked; fronds 30-37 cm. long, nearly as broad, deltoid, bipinnate except at the very apex; lower pinnae long-stalked, 7.5-12.5 ~~c~~ cm. long, 5-6.4 cm. broad, numerous close lanceolate pinnules on each side, the lower ones 2.5-3.7 cm. long, 1.2-1.6 cm. broad, the apex acute, the edge cut down to a winged rachis below into deeply-toothed oblong segments 8 mm. long, 4 mm. broad; texture herbaceous; rachis slender, naked, substramineous; veins pinnate; 4-5 lateral simple veinlets on each side in the lower segments; sori linear, not reaching to the edge.

From Central China to Shanghai, southwards to Hongkong, Kwangtung, Kweichow.

34. *Diplazium virescens* Kze. Bot. Zeit. 1848. 537; NPfl. 226; Matthew 358, (1911).

Asplenium virsescens Mett., Mett. n. 227, 1859; HKBK. 237.

Rhizomes creeping; scales blackish, lanceolate-subulate; stipes 15 cm. long, deltoid, bipinnate below the middle; lower pinnae 12.5 cm. long, 7.5 cm. broad, pinnate below the centre; pinnules 3.7 cm. long, 1.2 cm. broad, the apex acuminate, the edge crenato-lobate, the base narrowed subddenly; rachis slender; texture thin; color pale green, veins pinnate in the lower lobes, with 1-3 veinlets on each side, sori oblong, small, nearer to the midrib than the edge.

Japan, Korea, China: Kweichow.

35. *Diplazium griffithii* Moore, Ind. 330, (1861); NPfl. 227.

Asplenium griffithii Baker, 1867, HKBk. 239.
Athyrium griffithii Milde, 1870; Bedd. 1876.

Stipes 30 cm. long, naked, firm, erect; fronds 30-45 cm. long, nearly as broad; lower pinnae 23-30 cm. long, 15 cm. broad, on stalks 2.5 cm. long; pinnules numerous, the longest 7.5 cm. long, 1.8 cm. broad, deeply teethed, not contiguous; rachis smooth, flexuous, substramineous; texture subcoriaceous, both surfaces naked; veins about 6 on a side in each lobe, with an oblong sorus on each, which is less than 2 mm. long,

long, touches the costa and scarcely reaches half way to the edge.

Assam, India, China: Yunnan.

(P. 211).
36. Diplazium nudicaule (Copel.) C. Chr. Ind. Suppl. 27, (1913).

Athyrium nudicaule Copel., Phil. Journ. Sci. Bot. III. 278, (1908).
Asplenium nudicaule Dunn and Tutcher, Fl. Kwant. et Hongk. 345, 1912.

Whole plant up to almost 2 m. tall, rhizome 1 cm. thick, horizontal-creeping, black, almost naked, scales very small, black, clothing the rhizome, towards its apex; stipes slender, 5 mm. thick, subasperate toward the base, atratous; fronds tripinnatifid, acuminate, rachis green; pinnae alternate, patent, acuminate, the largest 50 cm. long; pinnules subsessile, acuminate, the largest to 11 cm. long, 4 cm. broad, truncate at base, glabrous, dark-green above, olive-green below, texture papyraceo-coriaceous, cut into round, obscurely serrulated lobes 9 mm. broad, subcontingeous, incised 2/3 way down towards the costa veins free; sori short from the costa, scarcely reaching the middle of the segments; the lower ones curved, induclum narrow, soon disappeared.

37. Diplazium flaccidum Christ, Bull. Geogr. Bot. Man. 125-126; (1906); Matthew 357, (1911).

Rhizome thick, 5 cm. in diameter, woody, suberect, tip clothed in dense subulate dark-brown opaque scales 1 cm. long; stipes thick like a man's finger, 70 cm. long, deeply sulcate, base dark-brown, tawny above, spacely furfuraceous; other parts are glabrous; fronds ample, tripinnatifid; pinnae about 28 on each side, the lower ones 60 cm. long, 20 cm. broad, shortly petiolate; pinnae remote, the lower ones 3½ cm. distant, erect-patent, very shortly petiolate, the others sessile, the uppermost ones broadly adnate, subdecurrent, 11 cm. long, 2 cm. broad, acuminate, base subequal, erect-~~b~~truncate, deeply lobed, lobes about 15 older the dentate apex, close, separate by acute sinuses, the lower lobes 1 cm. long, 7 mm. broad, obtuso-truncate, entire or very shortly crenulate, veins pinnate in lobes, about 8 on each side, oblique, distinctly forked from the middle; sori very narrow, straight, about 4 on each side, the longest 1 cm. long, quite, irregular, forked in some, not reaching to the margin, brown; indicium linear, inconspicuous, soon evanescent; color light green, texture flaccid, subcoriaceous.

Szechwan - Omei Shan.

38. Diplazium polypodioides Bl. Enum. 194, (1828); Christ, 219; NPfl. 227.

Microstegia polypodioides Presl., 1849.
Asplenium polypodioides Mett., 1856; HKBK. 238.
Diplazium frondosum J. Sm., 1841; Matthew 357, (1911).

Caudex erect, subarborescent, densely clothed at the crown with long brown fibrillose scales 2.5 cm. long; stipes densely tufted, stout, green, 30 cm. or more long, rather densely muricated, not scaly, but slightly furfuraceous; fronds 1-1.33 m. long, 45-60 cm. broad, with 8-9 pinnae on each side below the simple ones at the apex, the lower ones 10-12.5 cm. apart, 23-30 cm. long, 15 cm. broad; pinnules numerous, spreading, 5-7.5 cm. long, 1.2-1.8 cm. broad, cut down nearly to the rachis into linear-oblong slightly-toothed lobes; texture herbaceous; both surfaces naked; color bright-green, rachis green, stout, nearly naked; veinlets about 6 on each side in the lobes; sori falling distinctly short of the edge.

Australia, Ceylon, India, Malesia, Formosa, China: Yunnan, Kweichow.

New to China.

var. henryi Christ, Bull. Geogr. Bot. Man. XVI. 127, (1906).

(P. 312).
A More vigorous form of the tropical Indian and Malayan type. Fronds tripinnatifid, pinnules 10 cm. long, 3½ cm. broad, broadly lanceolate incised almost down to the costa near the base; lobes subacute, lanceolate, l½ cm. long, 6 mm. broad, margin grenulate; sori 5 on each side, 5 mm. long.

China: Kweichow, Yunnan, Szechwan.

var. sinense Christ, Bull. Geogr. Bot. Man. XVI. 127 (1906).

From the type this variety differs in its dimension being almost half as much small, with slender stipes; stipes 30 cm. long, herbaceous-stramineous, glabrous; fronds 45 cm. long, 30 cm. broad, bipinnate, not tripinnatifid; pinnae 8 cm. long, 6½ cm. broad; pinnules 4½ cm. long, 1 cm. broad, lobes shortly decussate.

Yunnan, Szechwan - Omei Shan.

39. Diplazium leptophyllum (Baker) Christ, Bull. Geogr. Bot. Man. 245 (1902).

Asplenium leptophyllum Baker, Kew Bull. 10, (1906).

Caudex erect; basal paleae lanceolate, castaneous; stipes weak, erect, 30 cm. or more long, naked or sparcely paleaceous; lamina large, deltoid, tripinnatifid, membraneous, shining green, glabrous, the lower pinnae larger than the upper ones, petiolate, deltoid, 20-25 cm. long; pinnules sessile, oblong-lanceolate, deeply pinnatifid, the tertial segment oblong, obtuse, serrate, 4-6 mm. broad; veins in segments copiously pinnate lower veinlets forked; sori closed to the costa, linear, 4 mm. long, inducium glabrous, membraneous, rather green, persistent.

Yunnan, Szechuan.

Intermediate between Diplazium squamigerum (Mett.) and Diplazium latifolium Don.

Var. minus Christ, Bull. Geogr. Bot. Man. XVI. 126, (1906).

This variety intermediate between D. squamigerum and D. latifolium is based upon a specimen collected by Dr. A. Henry (No. 13106) in Yunnan, which distinguishes itself by much smaller size, opposite pinnae, and smaller and less sori.

Yunnan, Szechuan.

40. Diplazium orientale Ros. Fedde Repert. 13, 129, (1914).

Stipes to 60 cm. long or longer, to ½ cm. thick at base, olive green or sorbid brown, lustrous, clad at base with linear-lanceolate paleae about 5 mm. long and 1 mm. broad, naked and smooth upward. Lamina ample, 1 m. long or longer, to 65 cm. broad, tripinnato-pinnatifid or subquadripinnate below, texture herbaceous, shining olive-green, smooth; primary pinnae suberect-patent, long-petiolate (petioles in the lower pinnae to 1.2 cm. long), the basal ones to 60 cm. long, 30 cm. broad, oblong-lanceolate, acuminate, about 18 cm. far apart; secondary pinnae in the lower pinnae about 15 cm. long and 8 cm. broad, truncate at base, on the petioles to 6 mm. long rather narrowly lanceolate, acuminate, costa narrowly winged; the tertiary pinnae subsessile, linear, acute, the basal ones proximate in upper side, slightly shorter, the lower and also the middle ones almost pinnatifid to the costa, the largest to 2 cm. long, about ¾ cm. broad; segments about 10 on each side, linear, obtuse, to 4 mm. long, 2 mm. wide, slightly oblique, margin serrato-dentate or subentire; veins in the segments pinnate, lateral veinlets simple to 6 on each side; sori linear, parallel, extending from the costules beyond the middle, those in the upper side of the base mostly diplazioid, the upper ones simple.

(P. 313).
Kweichow; Gan-chuan; Hainan.

A larger form of Diplazium polypodioides Blume but easily distinguished by its frond being once more pinnate. From Athyrium alatum Christ by its larger size and, more particularly, its diplazioid sori.

41. Diplazium calogramma Christ, Not. Syst. 1. 45, (1909); Matthew 357, (1911).

An ample fern with tripinnatisect frond; rachis yellow or lead-stramineous, entire plant naked. Pinnae 45 cm. long, 22 cm. broad, oblong, acuminate-caudate, petiole 2 cm. long, pinnules about 20 on each side the lower ones petiolulate, base equal, the upper ones sessile base adnate on the posterior side, somewhat cuneate; 20.5 cm. long, 3.5 cm. broad at base, long-caudate, pinnatifid to a broad wing 5 mm. broad, segments confert, sinuses almost none between lower ones, about 15 on each side, serrated below the apex, broadly lanceolate, obtusish or subacute, 1.5 cm. long, 6 mm. broad, subfalcate, serrato-crenate, veins about 10 on each side, forked fron the middle; sori filiform, the lower ones curved, the upper ones straight from costule to margin, regular, 5-7 on each side, dark-brown; -inducium brownish-red, very narrow but conspicuous.

Yunnan.

42. Diplazium viridissimum Christ, Not. Syst. 1. 45, (1909); Matthew 358, (1911).

Rhizomes ligneous, coarse; stipes stout, thick as a swan's quill, reddish-straminous, 60 cm. long, or longer, base very densely clothed with strongly incrassate subulate dark-castaneous flaccid scalelets; almost 1 cm. long, glabrous in other parts; frond ample, tripinnatifid; pinnae 50 cm. long, 15-20 cm. broad, acuminate, ovate-deltoid, base scarcely narrowed, petiole about 6 cm. long; pinnules about 20 on each side, often opposite, the lower ones shortly petiolate, ciliated at the base, the upper ones sessile, erect-patent, 11 cm. long, 3 cm. broad at base, incised to ~~n~~ a wing 2-3 mm. broad, acuminate; segments of tertiary order confert, sinuses almost none, about 15 on each side, broad ovate, obtuse, 12 mm. long, 8 mm. broad, acute but shortly crenato-serrate; veins oblique, about 7 on each side, bi- or tifurcate; sori about 5 on each side, extending from costa to the middle of segments short, 3 mm. long, brown, pr~~o~~ominent, the lower ones branched; inducium inconspicuous, almost none; texture flaccid herbaceous, color light green.

Yunnan.

43. Diplazium opacum (Don) Christ, Bull. Geogr. Bot. Man. 242, (1906).

Hemionitis opacum Don, Prod. Fl. Nepal. (1825).
Gymnogramme opaca Spring, 1883; HKBK. 378.
Dryopteris o~~A~~pacum C. Chr., Ind. 280, Cum Syn. 1906.
Athyrium opacum Copel., 1908.
Leptogramme opaca Bedd., 1883.
Phegopteris obtusata Christ, Farnk. Erd. 274, 1897.
Nephrodium obusata Diels, 1899, NPfl. 171.

Stipes 45-60 cm. long, strong, stramineous, glossy; fronds several ft. long, often 60 cm. broad; lower pinnae often 60 cm.

long 15 cm. broad; pinnules close, lanceolate, cut down nearly to the rachis below into close oblong, slightly-toothed lobes; texture herbaceous rachis and both sides naked; veinlets forked; sori oblong, irregular, close to the midrib.

India, Java, China: Yunnan.

(P. 214). 55. Diplaziopsis C. Chr. Ind. Fil. 227, (1905)
(Allantodia Wallich.), Pl. Asiat. Rar.
I. 44. 1830, (non. R. Brown, 1810).

Type: Asplenium javanicum Blume.

Sori dorsal, linear or oblong, running from near the costa to the first areolae; inducium suasage-shaped, fastened all round the receptacle, quite enclosing the sorus when young, rupturing irregularly in the middle when the spores mature. Fronds simply pinnate; veins anastomosing, forming 2-3 rows of more or less hexagonal areolae near the margin. Rhizomes short; stipes not articulate to the rhizome.

Species 2, one in Australia and tropical Asia, the other is endemic in China.

Key to species

I. Lateral pinnae up to 16 cm. or more long, 4 cm. broad,
apex acuminate sori to 1.2 cm. long....1. *D. javanica*

II. Lateral pinnae to 6 cm. long, 1.3 cm. broad,
apex long-caudate or cuspidate; sori about 4 mm.
long..............................2. *D. cavaleriana*

1. Diplaziopsis javanica (Bl.) C. Chr. Ind. 227, (1905); Matthew 357, (1911).

Asplenium javanica Blume, 1828, Enum. 175; Fil. Jav. 175.
Allantodia javanica Brevis, 1875; NPfl. 229; Christ 213.
Allantodia brunoniana Wall., Pl., Asiat. Rar. I. 44. t. 52. 1830; HKBK. 246; Bedd. Ferns S. Ind. 52 t. 159.
Athyrium brunonianum Milde, 1870.

Rhizomes erect, covered with lanceolate scales; stipes 15-35 cm. long, 6 mm. thick, slightly scaly at the base, naked upward, broadly sulcate. Fronds ample oblong-lanceolate often 60 cm. long, 30 cm. broad, simple pinnate; pinnae ~~6~~7-9 on each side alternate the terminal one slight larger, sessile or very short-stalked, 10-15 cm. long, 2.5-3.7 cm. broad, linear, the apex long attenuate or caudate, of the base obliquely truncate on both sides of the base, the midrib, forming 2-3 rows of hexagonal areolae occupying the outer half of the space between the midrib and the edge, bounded by an e intramarginal line, the margin entire or irregularly crenate; sori confined to anterior veinlets of the first forkings. Texture membranceo-herbaceous; surface naked.

Ceylon, Java, India, Formosa, Polynesia, China: Szechuan, Kweichow, Yunnan.

2. Diplaziopsis cavaleriaus (Christ) C. Chr. Ind. Suppl. 25, (1913).

Allantodia cavaleriana Christ, Bull. Geogr. Bot. Man. 245. c. fig. (1906).

Rhizomes subcreeping, ascending, clothed with stout, opaque brown lanceolate-subulate scales 1 cm. or more; stipes slender, sulcate, 2 mm. thick, rufo-stramineous, naked and so as the other parts of the plant, 28 cm. long. Fronds 38 cm. long, 12 cm. broad, lanceolate, terminal pinna similar to the lateral ones, not attenuate, towards base, pinnae 3 cm. apart in the middle, alternate, erecto-patent, about 12 on each side, sessile, base truncate- subcordate, lanceolate, 5½ cm. long, 13 mm. broad in the middle, acuminate, margin subentire, or crenulate, veins close, over 30 on each side, forked almost from the middle sometimes from base towards margin forming two rows of areolae;
(P. 215).
sori dense, oblique, about 30 on each side of the costa, placed along lateral veins very slightly incurved, parallel from costa to the middle of pinnae, elevated, ovate-lanceolate, 4 mm. long, 1½ broad, brown, inducium black opaque and adiaphanous, somewhat carnose, at first closed soon corregated, exposing the sporangia, Texture herbaceous. Color light green.

A rather small fern, in habit and dimension resembles Asplenium augustifolium Mich. Distinguished by very corwded sori along all lateral veins which are branching more high up from the base towards the middle of sori; while in Diplaziopis javanica (Wall.) The lateral veins forked near from the base and the sori borne only on the anterior forking, with the posterior branch remaining free from sori; so that the soriferous veinlet alternate with the sterile one and thus sori being much wider spaced. Moreover the inducium in present species is black white in the other gray, membraneous and exceeding thin and delicate.

56. Phyllitis Ludwig, Instit. Hist. Phys. Veg. ed. II. 142, (1757).

Type: Asplenium scolopendrium L.

Characters of Asplenium except that the sori and inducium are arrange in oppoiste pairs, one originating from the atnterior side of a vein or veinlet, the other from the posterior side of the next higher vein or veinlet and so the inducia opening towards each other. Spores bi-lateral. Frond fasciculated simple, entire, lobed or pinnate, frequently abnormally forked, plain, undulate, or with a coenosa, crested apex; veins forked; veinlets free, the anterior and posterior branch of each group contiguous, Carallel and sporangiferous on their proximate sides, constituting two linear, confluent sori, each furnished with a linear inducium, the free margin of which connive. Stipes not articulated to the rhizome. Rhizomes short and fibrous.

Sp. 15, inhabiting different regions of the world under a wide range of climate, 2 in China.

Key to species

1. Frond orbicular-cordate........................1. P. delavayi
1. Frond ligulate-oblong..........................2. P. scolopendrium
1. Fronds ovate-cordate with acuminate apex...3. P. cardiophylla

1. Phyllitis delavayi (Franch.) C. Chr. Ind. 492 (1906); Matthew in Journ. Linn. Soc. 39; 376 (1911).

Scolopendrium delavayi Franch., Bull. Soc. Bot. Fr. 32: 29 (1885); Christ in Farnkraut. Erde 213; Diels in Nat. Pfl. Fam. I. 4. 235.

Rhizome short, small, erect, clothed up to the collum with blackish lanceolate subulate scales; stipes tufted, shining ebeneous, glabrous slender, chennelled above, 7-12 cm. long; frond simple, entire, orbicular or suborbicular, obscurely undulate, deeply cordate at the base with broad or rarely close sinuses, 5-6 cm. across, texture pellucid, light green; veins flabellate, repeatedly dichotomous, free; sori borne on the secondary or tertiary veins, elongated, not attingent at the ends, indusium thin membranaceous, persistent, opening towards one another.
(F. 316).

Yunnan, Szechwan, Kweichow, also Burma.

Distinct for its simple orbicular deeply cordate leaves, resembling those of our waterlilies. The size of leaves and the length of stipes vary great deal, some plants having leaves as small as 1.5 cm. across, provided with rather a long stalk, others having stalks not exceeding 1 cm. in length but with rather large leaves. A fairly common fern in S. China, thriving best in moist shades in wooded gorges and ravines.

2. Phyllitis scolopendrium (L.) Newm. Hist. Brit. Ferns, ed. II. 10, (1844).

Asplenium scolopendrium L., Sp. 2. 1079, 1753.
Scolopendrium scolopendrium Karst., 1880-83.
Scolopendrium vulgare Sm., 1793; HEBK. 246; Christ 211; NPfl. 250.
Phyllitis lindeni Maxon, 1900.

Stipes 10-20 cm. long, fibrillose below; fronds 15-40 cm. long, 2.7-7.5 cm. broad, ligulate-oblong, entire, the base cordate with broader equal or unequal rounded auricle on each side; texture subcoriaceous; veins in groups of 2-4, rarely anastomosing.

N. America, Britain, Cochlam, Spain, Azores, India, Caucasus, Japan, China: Szechwan, Kweichow, Yunnan.

3. Phyllitis cardiophyllum (Hance) Ching Comb. nov.

Micropodium cardiophyllum Hance, Journ. Bot. (1883) 268.
Asplenium cardiophyllum Baker, Ann. Bot. 5: 311 (1891); C. Chr. Ind. (1906); Matthew in Journ. Linn. Soc. 39: 344 (1911).

Rhizome terete, wide-creeping, 3-4 mm. across, clad in dense, minute shining brown, spreading setae; stipes 2-5 cm. apart, uniseriate, slender, flexible, somewhat incrassate at the base, shining ebeneous, 3-sulcate on the upper side with the middle groove the broadest, all extending from the base up to the apex, broadly keeled on the under side, to 20 cm. or more long, scarcely 2 mm. broad at the base, not articulate to the rhizome; fronds simple, deeply cordate-ovate in outline, acuminate, with broad rounded, sometimes rotundo-truncate auricle on each side at the base, 10-15 cm. long, 7-10 cm. broad, margin entire, usually somewhat obscurely undulate, very rarely sinuate; sinus 5-10 mm. broad, 2-3 cm. deep, usually open, sometimes close by the imbrication of the auricles, texture chartaceous, glabrous, pellucid, light green above, pale below, costa rather prominent below except towards the apex, the lower half similar to the stipe in coloration, inconspicuous above, lateral veins very fine, scarcely seen on the under surface but very distinct when held up against light, obliquely patent, 1.5-2.2 mm. apart, parallel, 3-4 dichotomously branched and meeting once or twice near the margin forming mostly one sometimes two rows of narrowly linear areolae between the costa and margin; with somewhat thickened mostly free or sometimes confluent apex ended submarginally, sori linear, 2-3 cm. rarely more long, nearer to the costa than the margin, about 1-1.5 cm. from the margin, 3-5 mm. or farther from the costa, the lower ones often scolopendrioid, the upper ones usually asplenioid, indusia of the same shape as the sori, membranaceous, greyish-white, margin entire; sporangia.

Endemic in the Island of Hainan, S. China also known in Formosa.

This little interesting fern was first collected in the Island of Hainan by a native collector in 18 and named by Dr. Hance as Micropodium cardiophyllum, which was changed to Asplenium by Baker and has
(P. 317).
remained as such ever since. A recent careful examination of an ample stock of materials from Hainan has vividly convinced me of considering this species most fit as a legitimate member of phyllitis by the presence of its scolopendrioid sori on the lower part of the frond, although they all gradually become asplenioid as go upward. Of about 50 plants examined by me, I found that about one-third, which are in full fructification, exhibit the character, peculiar to the genus, and moreover, that the scolopendrioid sori seem mostly confined to the lower one third of the frond, while those in the upper 2/3 are almost all strictly of asplenioid nature. It is most likely that the

type specimen for Micropodium cardiophyllum Hance are plants in such perhaps chiefly accounts for the uncertainty of systematic position for the present species. Besides the asplenioid character of the sori on the upper part of the frond, it is very interesting, however, to note that while some of the sori are strictly of scolopendrioid nature, i. e. they are in opposite pairs, and their indisia directly opening towards each other, there are good many others, which are separated by one or more intervenning veins of the same group and still some others which are not in connivent pairs, opening face to face but either opening downward or upward singly. In spite of this deviation the reason for which was quite explicitely explained by W. J. Hooker (Acr. Sp. Fil. IV. p. I), it seems legitimate to incoporat it in Phyllitis or probably better still to create a distinct genus intermediate between Asplenium and Phyllitis as the nature of the its indusium indicate. In view of the presence of the distinct midrib and the anastomozaination of the veinlets towards the margin, the present species naturally falls in Antigramma Presl. Diels in Engl. and Prantl. Nat. Pfl. Fam. I; 4, 236 f. 124, A., a section of about 4 or 5 species endemic in Brasil and not known from Asia hitherto. The present species differs from its far-off relatives wide-creeping rhizome, deeply cordate-ovate frond of chartaceous pellucid texture, etc.

57. Camptosorus Link, Hort. Berol. 2. 69, (1833).

Type: Asplenium rhizophllum L.

Slender fern with tapering simple entire or undulate frond, bearing linear or oblong sori several times longer than broad, irregularly scattered on either side of the reticulate veins or sometimes crossing them, partly parallel to midrib and partly oblique to it, the outer ones more or less approximate in pairs. Indusium membranaceous Sporangia pedicelled, provided with a vertical ring which opens transversely (Greek, referring to the bent or curved sori).

A genus of only 2 species, on in N. America, the other in Asia.

Camptosorus sibiricus Rupr. Distr. C. Crypt. vasc. Ross. 45, (1845).

Scolopendrium sibiricus HK., 1860; HKBF. 249; HK. 2 cent. t. 36; KPfl. 251; Christ, 213; Bull. Geogr. Bot. 12. 236 c. fig. 1902.

Antigramma sibirica J. Sm., 1875.
Phyllitis sibiricus O. Ktze., 1891.

Rootstock short, fibrously rooted, clad with brown finely reticulated linear subulate scales. Barren fronds ovate-acuminate, 2.5 cm. long, 6-10 mm. broad; fertile fronds 8.5-15 cm. or more long, 6 mm. broad the apex elongated like a whip and rooting and forming a new plant, the base not auricled, and sometimes hastate, narrowed gradually or suddenly margin entire or

obscurely crenate, often forked toward apex;
(P. 318).
stipes 5-7.5 cm. long, tufted, naked, green upwards, ebeneous below; texture subcoriaceous; sori linear or oblong.

Kamtschatka, Tsus-sima, Siberia, Japan, Corea, N. China: Chefoo, Kwantung, Kweichow, Shansi, Kansu, Shantung, Chihli.

58. Asplenium Linne (Gen. Plant. 783, 1875), Spec. Plant. 1075, (1753).

Type: Asplenium trichomanes L.

Sori linear or linear-oblong, straight or slightly recurved, spring from the upper sides of the veins, oblique to the costa, or occupying the sides of the single central veins of linear ultimate segments, only 1 sor~~b~~us to a vein. Indusium of the same shape as the sori springing from the same sides of the veins, opening obliquely towards the margin. Fronds simply or compound; veins free or rarely anastomosing; rhizome creeping or erect, the scales coarsely concellate, with the areolae mostly discoloured, i. e. the cells with side walls conspicuously thickened and mostly brown-coloured, the lumina generally pale or decoloured; stipes not articulate to therhizome; with 1 or 2 free more or less concave vascular bundles, which mostly united toward the lamina into a single tetrarchous ones.

Sp. about 519, dispersed all over the warmer parts of the world; 70 are known in China.

Closely allied to Athyrium (Roth.) J. Sm. differs in having straight or only slightly curved single indusium attached to the upper side of the veins, rarely double, stipes filiform or nearly so with vascular bundles separate and peripheral, or, if united toward the summit forming a lunate bundle; scales of the rhizomes and stipes narrow, of firm texture and with thick-walked cells.

Key to sections

1. Veins free.

    2. Fronds simple, not in rosette..........§ Neottopteris
    2. Fronds simple, arranged in a rosette...§ Resulata
    2. Fronds divided.

        3. Ultimate segments linear or oblong, each with a single soriferous veins; indusium opening towards the margin..................§ Darea
        3. Ultimate segments various, each with several to many soriferous veins; indusium typically and obliquely opening towards the costa or costule.

1. Veins united at the apex by a transverse, continuous, more or less marginal or intramarginal line. Fronds simple ....§ Thamnopteris

1. Veins anastomosing more or less copiously towards the margin; fronds simple or once pinnate.....§ Asplenidictyum

Key to species of Asplenium

1. Fronds simple; veins united at the apex by a transverse, continuous, more or less marginal or intramarginal line (Thamnopteris).

   2. Fronds spathulate

(P. 319).

      3. Midrib prominently raised underneath.

         4. Margin of the frond entire, midrib scaly...1. A. antrophyoides

         4. Margin of the frond somewhat irregularly repand, midrib glabrous...............2. A. subspathulatum

      3. Midrib keeled underneath.........3. A. grevillei

   2. Fronds lanceolate or linear-lanceolate.

      3. Margin crenulate or denticulate towards apex.

         4. Texture thin herbaceous......4. A. iridiphyllum

         4. Texture coriaceous...........5. A. holosorum

      3. Margin entire or at best undulate.

         4. Fronds to 2½ cm. broad, stipes 5 cm. long...6. A. loxogrammoides

         4. Fronds much broader, stipes much shorter or almost subsessile

            5. Fronds to 5 cm. broad, sori reach a short distance from the margin...7. A. [illegible]

            5. Fronds much broader, sori extend only half way to the margin...............8. A. nidus.

1. Fronds simple, veins free (Neottopteris).

   2. Fronds above 5 cm. broad, stipes furfuraceous on the lower part...........................9. A. squamulatum

   2. Fronds below 2 cm. broad.

      3. Fronds crenato-serrate...........10. A. griffithianum

3. Fronds entire.

4. Fronds scaly, particularly on the midrib beneath..11. A. pinfaense

4. Fronds entirely glabrous.....12. A. ensiforme

1. Fronds once to several times pinnate; veins free. Ultimate segments with several to many soriferous veins; inducium opening mostly towards the costa (Euasplenium).

2. Fronds simply pinnate; pinnae entire or incised, but not deeply pinnatifid.

3. Pinnae adnate.....................13. A. adnatum

3. Pinnae free, but either petiolate or sessile.

4. Pinnae short, roundish or oblong, blunt, not more than 2 cm. long.

5. Fronds under 2 cm. broad.

6. Texture membranaceous, sori confluent at length.................14. A. exiguum

6. Texture coriaceous, sori not confluent.

7. The wing on the stipe and rachis erose-dentate............15. A. microtum

7. The wing on the stipe and rachis entire.........................16. A. trichomanes

5. Fronds broader............17. A. normale

4. Pinnae linear or linear-lanceolate to linear-oblong, acute or acuminate, rarely obtuse more than 3 cm. long.

5. Pinnae more or less equally cuneate on both side at the base.

6. Pinnae sharpely or crenate serrate, texture coriaceous.

7. Pinna above 10 cm. long, and 1.2 cm. broad...............18. A. winghtianum

7. Pinnae to 7 cm. long, and [illegible] cm. broad.........................19. A. lofouense

6. Pinnae cut on each side into about 12 crenato-dentate lobes, texture herbaceous.. ....20. A. writhtioides

5. Pinnae unequal sided at the base, i. e., the acroscopic side broadly cuneate or truncate and the basiscopic narrowly cuneate or demidiate.

6. Pinnae more or less irregularly incised or lobed.

7. Midrib distinct; pinnae irregularly inciso-serrate..............21. A. crinicaule

? 32(?)

7. Midrib indistinct; pinnae irregularly lobed.. ....22. A. dimidiatum

6. Pinnae sharply serrate or crenato-dentate.

7. Pinnae below 5 cm. long, chestnut brown.

8. Pinnae trapezoid, blunt at the apex, margin inciso-crenate.

9. Pinnae to 3 cm. long, 10 mm. broad ....23. A. nnilaterale

9. Pinnae to 6 cm. long, 2 cm. broad... ....24. A. obscurium

8. Pinnae not trapezoid, acuminate at the apex.

9. Pinnae deeply incised into bifid lobes, texture pellucid-herbaceous, sori 1 to each tooth...25. A. chiclosorum

9. Pinnae crenato-dentate with adpresed teeth, texture much thicker, sori not in teeth.26. A. centro-chinense

7. Pinnae above 7 cm. long, stipes greenish or brownish.

8. Pinnae broadly lanceolate, texture coriaceous, sori to 3.5 cm. long, reaching from the midrib to costa.27. A. macrophyllum

8. Pinnae narrowly lanceolate, texture herbaceous, sori to 1.5 cm. long, short from both midrib and margin.

9. Pinnae dentate, upper half of the rachis not winged.............................28. A. lineatum

9. Pinnae cut into obovate lobes near the base upper half of rachis narrowly winged.....................................29. A. wrightii

2. Fronds pinnate, pinnae deeply pinnatifid or pinnate at the base.

3. Pinnules or pinnae linear.

4. Fronds digitately-pinnate....30. A. septentrionale

4. Fronds not digitately pinnate.

5. Fronds lanceolate, scarcely over 3 cm. broad.

6. Pinnae flabellate-cuneate, less than..............................31. A. germanicum

6. Pinnae oblong or oblong-lanceolate, more than 20.

7. Pinnae pinnatifid into 4-8 segments on each side..........32. A. sampsoni

7. Pinnae pinnatifid into 3 segments on each side................33. A. yunnanense

5. Fronds oblong to deltoid-ovate, usually over 4 cm. broad.

6. Frond above 10 cm. broad, pinnae above 5 cm. long...............34. A. praemorsum

6. Fronds below 8 cm. broad, pinnae below 5 cm. long.

7. Pinnae flabellato-pinnatifid, pinnules or segments spinosely toothed.

8. Pinnules simple or bifid, broad, slightly spinosetoothed..35. A. serellii

8. Pinnules usually more compoundly cut into narrower strongly revolute and more sharply toothed segments...........................36. A. varians

7. Pinnae regularly pinnatifid into linear simple pinnules....37. A. tenerum

(P. 321) 3. Pinnae or pinnules ovate-rhombic or subdeltoid, cuneate.

4. Texture herbaceous.

5. Pinnae gradually reduced towards the base of the fronds.

6. Apex of the frond prolonged and radicant.............................38. A. lushanense

6. Apex of the fronds not prolonged nor radicant.

7. Pinnules petiolate; stipes to 10 cm. long.............39. A. fontanum

7. Pinnules at best sessile, more generally decurrent; stipes to 5 cm. long.

8. Stipes fibrillose on the lower half, texture thick herbaceous...........................40. A. moupinense

9. Inducium broad-ovate, fugaceous.............41. A. woodsioides

9. Inducium linear-oblong, persistent...........42. A. incisum

5. Pinnae scarcely reduced towards the base of the fronds.

6. Fronds below 10 cm. long, 4 cm. broad.

7. Fronds gemiferous at the apex, pinnae ovate-palmate, sessile.................................43. A. fugax.

7. Fronds not gemiferous at the apex, pinnae deltoid, petiolate.....................................44. A. interjectum

6. Fronds to 38 cm. long, 12 cm. broad.............................45. A. latecuneatum

4. Texture coriaceous or subcoriaceous or subcoriaceous.

5. Fronds above 30 cm. long; pinnae above 10 (-20) cm. broad.......46. A. pellucidum

5. Fronds much shorter, pinnae to 8 cm. long.

6. Pinnules spathulate.

7. Fronds to 5 cm. long, half as broad.. ....47. A. ruta-muraria

7. Fronds above 15 cm. long and 10 cm. broad..........48. A. adiantumnigrum

6. Pinnules not spathulate, but obovate to ovate-rhombpic.

7. Stipes scaly throughout, pinnae more than 10 on each side.

8. Pinnules petilate, ovate-rhombic 4.. ....49. A. laciniatum

8. Pinnules sessile, obovate-truncate.. ,............50. A. saxicola

7. Stipes glabrous or scaly near the base, pinnae 2-5 on each side......... ....51. A. comptum

2. Fronds more copiously tripinnatifid to 4-pinnate.

3. Fronds deltoid-oblong, i. e. the basal pinnae much the largest.

4. Fronds tripinnatifid.

5. Pinnae about 4 on each side...................... ....52. A. logkönse

5. Pinnae numerous.

6. Texture herbaceous, costa of the pinnae broadly winged.......53. A. cavalerianum

6. Texture subcoriaceous, costa of the pinnae not winged.

7. Pinnules rhombic, above 7 cm. long....... ....54. A. affine

7. Pinnules ovate-cuneate, much shorter 55................55. A. cuneatum

4. Fronds 3-4 pinnate,.........56. A. laserpitifolium

3. Fronds ovate-oblong, i. e. the basal pinnae shortened. (P. 322).

4. Texture coriaceous, ponnules flabellato-pinnatifid ....57. A. wilfordii

4. Texture herbaceous, pinnules crenate or lacise.

5. Fronds to 90 cm. long, 30 cm. broad............ ....58. A. grandifrons

5. Fronds below 50 cm. long, 13 cm. broad.

6. Fronds quadripinnate.......................... ....59. A. rhachidesosum

6. Fronds tripinnate.

7. Fronds slender lanceolate, pinnae far apart...........60. A. tenuissimum

7. Fronds oblong-lanceolate, pinnae closer..........61. A. tenuifolium

1. Fronds compoundly divided; ultimate segments linear or oblong, each with a soriferous vein; inducium opening towards the margin (Darea).

2. Stipes bright brown, texture coriaceous............... ....62. A. coenobiale

2. Stipes green, texture carnoso-herbaceous.

3. Ultimate segments almost horizontally patent, 3 mm. long...........................63. A. davallioides

3. Ultimate segments erecto-patent, 6-8 mm. long.

4. Pinnae linear-oblong, pinnules 8-15, only the lowest bilobed on the upper side at the base; fronds not rooting at the apex.................. ....64. A. belangeri

4. Pinnae broad-oblong, pinnules 3-5, at least the lowest two 2-3 lobulate; fronds usually rooting at the apex...............65. A. achilleifolium

1. Fronds divided or simple; veins more or less copiously anastomosing towards the margin (Asplenidictyum). Fronds simply pinnae...............66. A. finlaysonianum

1. Fronds simple, ligulate, arranged in a rosette; veins free (Rosulata).......................68. A. sepeluncae

1. Asplenium entrophyoides Christ, Bull. Geogr. Bot. Mans. (1909) Mem. XX. (170); Matthew 344, (1911).

Rhizomes short, strongly radicose, crowned with scales, which are broadly ovate with rather ample opaque base, 4 mm. long and as broad, apiculate and ochraceous-brown. Leaves fasciculate, (about 6 together) antrophyoid, broadly decurrent towards base, lamina 25 cm. long, 4½ cm. broad, spathulate, i. e. the upper part broadest, and abruptly cuspidate; costa slender, prominent with sparse ovate scales; veins slender, patent, numerous, simple sometimes furcated, 1 mm. apart; the margin of leaves entire, thickened; sori placed on the upper 1/5 of the frond very close, near to the costa, -1 cm. short from the margin patent, about 30 on each side, strongly unequal, -1 cm. long, 1 mm. broad, obtuse, light brown, inducium narrow, gray, persistent, color obscurely green, texture flaccid papyraceous, both surfaces opaque minutely furfuraceous.

Kweichow.

2. Asplenium subspathulatum Ros., Fedde Repert. 13, 122, (1914).

Stipes fasciculate, almost 1 cm. long, flatten when dried, clothed at base with membranaceous reddish-ferruginous paleae 6 mm. long and 1½ mm. broad. Lamina simple, membranaceous, glabrous, to 40 cm. long or slightly longer, 6 cm. broad, straight or subfalcate, elongato-obovate, with apex about 12 mm. long, cuspidate, gradually shortly narrowed along stipes, margin slightly irregularly repand, narrowly recurved; the midrib black, scarcely raised above, prominent below and of the same color as lamina; veins decurrent at 70°, mostly furcate, extending to the margin and connected by a submarginal line, the middle about 1 mm.
(P. 323).
distant from each other, sori linear borne near the costa, divided slightly beyond the middle, occupying only the upper have of the lamina, inducium firm, broad, gray.

Kweichow: Gan-chuen.

The frond almost spathulate, narrowed from the upper broad part downward to a somewhat rugged stipe as in A. spathulatum Baker and A grevillei Wall.

3. Asplenium grevillei Wall. Lest. n. 1036, (1828); HK. et Grev. Ic. Fil. t. 228. (1831); HKBK. 191; NPfl. 234; Matthew 345, (1911).

Fronds 30-45 cm. long, 7-7.5 cm. broad, lanceolate-spathulate, narrowed to an acute apex and suddenly below to a broad wing to the stipes, which grows very gradually narrower downwards, the margin entire; texture coriaceous; midrib keeled below; veins nearly horizontal, those in the body of the frond about 1 mm. apart; sori on most of them extending withing

a short distance from the edge.

India, China: Yunnan.

4. Asplenium iridiphyllum Hayata, Ic. Pl. Form. 223. f. 1[illegible]2. (1914).

Rhizome erect, very short, scaly, scales cuspidate-lanceolate, 6 mm. long, 1½ mm. broad, apex cuspidate, base rounded or subpeltate, margin subentire or remotely subdenticulate; stipes clustered, very short or none with scaly base, scales subulate-lanceolate, 4 mm. long, ½ mm. broad, apex subulate, base rounded, subpeltate, margin ciliate with long and remote chestnut-brown-gray hairs. Fronds lanceolate, apex gradually acute to obtuse, base very attenuate to very short or subsessile stipes, 27 cm. long, 28 mm. broad, margin irregularly crenulate, subundulato-plicate, simple, ascendent-denticulate towards the apex, glabrous above, covered on the under surface along the costa on the upper portion of the frond with minute sparce scales, scales irregularly amoeboid, multiradiate, ½ mm. in diameter, dark blackish, the upper surface primarily covered by sparce scales, finally becoming glabrous; costa elevated below, veins and veinlets invisible below; texture strictly herbaceous or membraneous.

Formosa, recently discovered in Hainan (McClure, 1922).

The sori are usually of a kind of the Asplenium type, but sometimes though very rarely, present transitional forms towards the Diplazium- type, in this respect, the fern may also be referrable to Daplazium iridiphyllum Hayata.

5. Asplenium holosorum Christ, Bull. Boiss. 7. 10. (1898); Matthew 345, (1911).

Rhizomes short, erect, hard, clothed with black rigid setae; stipes 3-6 together, facciculated, brownish green, 3 cm. long, gradually decurrent upward into lamina, base clothed with sululate brown scales 1 cm. long, otherwise glabrous in all parts. Fronds 15-20 cm. long, 2½ cm. broad, decurrent downward into a long narrow wing towards stipes, acuminate, ovato-lanceolate, margin almost entire, very narrowly revolute, crenate toward apex; texture coriaceous, color pale green, costa conspicuous, flatten, veins almost hidden, mostly forked, strongly oblique; sori linear, 1½ mm. broad, 25-30 on each side of the costa, much oblique, variable in length, but generally from costa to margin or falling 1 mm. short from margin with interstices 2 mm. broad; inducium thin membranaceous whitish.

Yunnan, Kwantung.

A specimen in the Herbarium of Canton Christian College collected from Loh Fan Mt. matches the description except of much larger size,

(P. 324).

fronds to 40 cm. long, 2.8 cm. broad, long acuminate or finely caudate, margin repand and irregularly sinuate all the way up and the sori falling a considerable way short of the margin.

6. Asplenium loxogrammoides Christ, Bull. Geogr. Bot. Man. (1909), mem XX 171+172; Matthew 346, (1911).

Rhizomes short, oblique, clothed with linear-lanceolate dark brown carinate scales 4 mm. long; leaves fasiculated, ovate-lanceolate on stipes 5 cm. long, gradually decurrent, acuminate. Stipes lead-colored, clothed with subulate dark purple scales; costa plainly conspicuous sparcely scaly. Lamina 20 cm. long, 2½ cm. broad, margin obscurely dentate-crenulate; flaccid-papyraceous of thinest texture, surrounded by a narrow incrassate marginal line; veins hidden, much oblique, 2½ mm. apart, forked from the middle or over the middle; sori oblique, narrow, about 25 on each side, sometimes touching the costa, sometimes touching the margin but usually leaveing a marginal space about 6 mm. broad, dark-brown; inducium thinest, gray, persistent; color light green.

Kweichow.

7. Asplenium simonsianum HK. Ic. Pl. t. 925, (1854); HKBK. 191.

Thamnopteris simonsiana Moore, 1857.
Neottopteris simonsiana J. Sm., 1875.

Fronds 30-45 cm. long, 2.5-3.8 cm. broad, tapering upwards into an acuminate point and very gradually below into a short stem, the margin nearly entire; midrib only rounded and prominent below; texture coriaceous; veins erecto-patent, about 1 mm. apart; sori copious, reaching from the midrib to within a short distance of the edge.

India, Bengal, China: Kweichow.

~~Kth~~ New to China.

8. Asplenium nidus L. Sp. 2. 1079, (1753); HKBK. 190; Christ 188; NPfl. 233; Benth. fl. Hongk. 450, 1861; Matthew 346, (1911).

Thamnopteris nida Presl., 1849.
Asplenium ficifolium Goldem, 1843.
Asplenium anstralasicun HK., 1849.
Neottopteris musaifolia J. Sm.

Fronds unidivided, 2/3-1.33 m. long, 7.5-20 cm. broad, lanceolate, acute or acuminate at the apex, tapering gradually below into a short stem, the edge entire, the midrib prominently raised and rounded on the back; texture coriaceous;

veins finelsnd parallel, about [illegible] lin. apart; connected at the apex by a transverse intramarginal line; sori linear, about 2.5 cm. or more long reaching about half way towards the margin.

A very variable species receiving a number of different names.

Polynesia, Australia, Africa, India, Loochoo Formosa, Hongkong, China: Kwantung, Chekiang, Hainan, Szechwan, Kweichow, Yunnan.

var. phyllitidis (Don) C. Chr. Ind. 123, (1906).

Asplenium phyllitidis Don, Prod. Fl. Nepal. 7, 1825.

Plants of smaller size; of-ten only the anterior branches of the forking veins soriferous.

Kweichow, Hainan.

A mere reduced form ~~A~~ of Asplenium Nidus L.
(P. 325).

9. Asplenium squamulatum Bl. Enum. 174; Nett. n. 17; HKBK. 192, NPfl. 233.

Thamnopteris squamulatum Presl., 1849.
Neottopteris squamulatum Fee, 1850-52.

Stipes tufted, 5-10 cm. long, strong, erect, scaly below. Fronds lanceolate, 30-45 cm. long, 5-7.5 cm. broad, narrowed to an acuminate apex, and very gradually below into the stem; the margin entire; texture very coriaceous; veins inconspicuous, 2 mm. apart, usually simple; sori reaching from near the midrib to 0.6-1.3 cm. of the margin; rachis stout, pale, the lower part furfuraceous.

Malesia, China: Kweichow.

New to China.

10. Asplenium griffithianum HK. Ic. Pl. t. 9281, (1854); Nett. n. 12; HKBK. 193 NPfl. 234.

Asplenium griffithii Baker, HKBK. 239.

Stiptes tufted, short; fronds lanceolate, 15-23 cm. long, 1.8 cm. broad, the point acuminate, narrowing below very gradually, the margin crenate-serrate; texture subcoriaceous; veins distant, obscure, usually once forked; sori reaching from the midrib two-thirds of the way to the edge.

Assam, Sikkim, Hongkong.

11. Asplenium pinfaënse Christ, Bull. Geogr. Bot. Mans. (1909) Mem. XX. 172; Matthew 346, (1911).

Rhizomes short, oblique, radicose, densely tomentose; leaves subfasciculated, 20 cm. long, gradually attenuate along short stipes, 1-1½ cm. broad, ligulate-linear, acute; rachis conspicuously plane, clothed with adpressed ovato-obtuse very narrow, flaccid ochraceous scales, the upper surface of the leaves sparcely scaly; veins inconspicuous, subpellucid, much oblique, 2 mm. apart, forked from the base; sori close, jumorous, to 40 on each side, 1 mm. broad, obtuse, 3-5 mm. long, ochrea-brown; inducium gray, flaccid, persistent; color obscure on the upper surface, pale green beneath; texture flaccid.

Kweichow.

12. Asplenium ensiforme Wall. List. n. 200, (1828); HK et Grev. Ic. Fil. t. 71. (1829); HKBK. 1911 Christ. 189; NPfl. 233.

Asplenium stnophyllum Bedd., Ferns Br. Ind. t. 147, 1866.

Stipes tufted, 2.5-7.5 cm. long, firm, erect, scaly, below. Fronds about 45 cm. long, 1.3-1.8 cm. broad, much acuminate towards the apex, edge nearly entire, lower part narrowed into the stem very gradually; texture coriaceous, veins immersed, inconspicuous, erecto-patent, usually once forked; sori broad, reaching nearly to both midrib a margin.

Himalayas to Ceylon, Japan, China: Kwantung, Yunnan.

A very variable species Henry's No. 11 515 A. from Mentze, Yunnan, with much longer and narrower linear fronds tapping gradually into long stipes, of rather a thinner texture and with distinct veinlets is probably an extreme form of the present species.

13. Asplenium adnatum Cop. Phil. Journ. Sci. Bot. 3. 284, (1909); Matthew 344, (1911).

Rhizomes suberect, 5 mm. thick; stipes confert, 10-15 cm. long, blackish-castaneous, paleae 5 mm. long, very narrow, subdeciduous, sparcely clotheing the stipes. Fronds 15-20 cm. long, about 3 cm. broad, simple pinnate, rachis green and unilinear above, and so as towards the stipes underneath; pinnae oblong, horizontal patent, or the upper ones ascenting apex rounded obscurely dentate, broadly adnate but mostly
(P. 326).
narrowed towards the base, the lower ones not diminiate, but subdistant, connective wing running along the rachis and broader upward; texture coriaceous, glabrous above, pale green and puberulous beneath; veins subflabellate, inconspicuous; sori few to a pinna long, oblique.

Kwantung: Tai Mo Shan.

A member of the group of A. crinicaule Hance, well characterized by the adnate, and throughout the most of the

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frond coalescing, very obtuse pinnae.

Closely allied to A. attenuate R. Br. from Australia.

14. Asplenium exiguum Bedd. Ferns. S. Ind. t. 146, (1863); Matthew 345, (1911).

Rhizome short, erect, clothed above with numerous subulate, black scales, stipes numerous, 7-30 cm. long, blackish-purple, more or less furnished with long, black, subulate scales. Fronds 4-15 cm. long, 6-20 mm. broad, simple pinnate, the rachis sulcate above, slightly flexuose, more or less extended at the apex into a naked tail and often bearing a young plant. Pinnae numerous, subsessile, form a broad base, in the smaller fronds suborbicular and simple crenate, in the large ones lanceolate oblong and pinnatifid, cuneato-excised below, the superior and inferior basal auricles 3-4-dentate or crenate, the other lobes 2-dentate or entire; superior pinnae gradually smaller, uppermost ones often very but fertile (with-2 sori); inferior pinnae gradually smaller, subrotund or flabelliform, always fertile. Texture membraneous; surfaces minutely hairy when young, at length naked; veins obscure, the apex thickened, sori of the larger pinnae arranged in a double rows, 1 row of 4-5 on each side of the costa and approximate to it, superior auricle bearing 1 more or less diver/ging sorus, rarely 2, sometimes none, lower auricle often barren, rarely bearing 1-2 sori.

Luson, South India, China: Yunnan, Shensi, Kweichow.

Closely allied to Asplenium fontanum, differs only by fronds less divided and more narrow, and with an ebeneous rachis.

15. Asplenium microtum Maxon. Contri. U. S. Nat. Herb. XII. 411, t. 60. (1909); Matthew 346, (1911); C. Chr. Medd. Goteb. Bot. Trädg. I. 79, (1924).

Rhizome suberect, 5 to 7 mm. in diameter, thickly best with rigid linear-lanceolate dark brownish scales about 2 mm. in length; fronds few (4 to 8), cespitose, divergent, subarcuate, 15 to 20 cm. long stipes dull purplish black, flexuose, 2-3 cm. long; lamina 12 to 17 cm. long, 11-13.5 cm. broad, linear; pinna subcoriaceous, deciduous, 25-32 jugate, mostly opposite or sub-opposite, approximate oblong, the base appearing (in dried specimens) narrowly long-cuneate, somewhat excised below, auriculate above, the apex rounded, the margins lightly crenate-sinuate, revolute in drying; lower pinnae shorter, broader, decidedly auriculate, somewhat reflexed, easily deciduous, the lowermost 2 or 3 distant, greatly reduced, subalternate or alternate, a minute, persistent bud with conspicuous chaff borne commonly at the base of the last or next to the last; stipe and rachis narrowly alate, the wing

conspicuously erose-dentate or even serrate; sori medial, linear-oblong, usually 6 (in 3 pairs) or 7, the odd one in the upper row; indusia ample, firm, glabrous, the margin lightly sinuate; spores dark brown, ovoid, somewhat cristate, conspicuously alate and reticulate.

Yunnan, Szechwan, Kweichow, Hupeh, Shensi.

Mentioned by Christ, sometime ago, under the name Asplenium trichomanes, as form "with distant strongly auriculate pinnae." A microtum is, apprently, a near erelative of A. trichomanes; but
(P. 327).
from this, which, in a typical state at least, seems to be confined to North America and Europe, it differs very noticeably in (1) its subcoriaceous texture, (2) its aurculate pinnae, these narrowly (3) its strongly revolute and lightly crenate-sinuate margins, and (4) the presence of a minute but very chaffy bud upon the rachis, near its base. This last is a character noted hitherto, in the group of Asplenium trichomanes, only in A. platyneuron and A. monanthes; in the former very rarely; in the latter commonly, sometimes near the base, but often in the apical portion. A mexican species of this group, as yet undescribed, has the fronds radicant and proliferous at the very apex.

May be an extreme form of A. trichomanes L.

16. Asplenium trichomanes L. Sp. 2. 1050, (1753); HKBK. 196; Christ. 192; NPfl. 235; Matthew 347, (1911).

Asplenium trichomanoides Houtt., 1753.
Trichomanes crenatum Gilib., 1792.
Phyllitis rotundifolia Moench., 1794.
Asplenium melanocaulon Willd., 1809.

Stipes densely tufted, 2.5-10 cm. long, naked, glossy, dark chestnut-brown, throughout polished. Fronds 15-30 cm. long, 1.2 cm. or rather more broad with 15-35 opposite pairs of sessile horizontal pinnae, which are 6-10 mm. broad, 3-4 mm. deep the lower ones gradually reduced and much remoter the edge slightly crenate, two sides unequal, the upper one the broadest and narrowed suddenly at the base; texture subcoriaceous veins pinnate, inconspicuous; rachis polished like the stem; sori linear-oblong, 3-6 on each side of the midrib.

Widely dispersed over the temperate regions of the Old World, from South Africa, S. and N. America, Britain to Himalayas: India, Formosa, Japan, China: Hupeh, Yunnan, Szechuan Anhwei Fukien, Hunan, Shansi, Kansu, Kweichow, Kiangsi, Chekiang.

Var. centrochinense Christ, Bull. Geogr. Bot. XIV. 113 (1904) c. fig.; Matthew 347 (1911).

Differs from the europena type in pinnae being flabellato-cuneate, apices broadly lobated; sori shorter and ovate.

Kweichow.

var. microphyllum Christ, Bull. Boiss. ser. 2. iii. 512, (1903); Matthew 347 (1911).

Differs from the type in very small pinnae.

W. Hupeh.

17. Asplenium normale Don, Prod. fl. Nepal. 7, (1825); HKSK. 197; Christ XII: NPfl. 236; Matthew 346, (1911).

Asplenium multijugum Wall., 1828.
Asplenium opacum Kze., 1851.
Asplenium pavonicum Brack., 1854.

Stipes 10-15 cm. long, tufted, wiry, blackish, polished. Fronds 12-30 cm. long, 3.8 cm. broad, with very numerous close-placed pinnae, the lowe ones, which are 1.8 cm. long, 6 mm. broad, deflexed, the point obtuse the edge inciso-crenate, the upper auricled and narrowed suddanly at the base, the lower truncate in a straight line; texture subcoriaceous; rachis glossy, nearly black; veins mostly once forked; sori in 2 unequal parallel rows.

Himalaya to Ceylon, Hawaii, Korea, Hongkong, China: Kwantung, Kiangsi, Kweichow, Yunnan, Szechwan, Fukien, Chekiang-Hongchow.
(P. 328).
A much reduced form collected around Hongchow, Chekiang differs from the type in much smaller dimensions and only sorus to each pinna.

18. Asplenium wightianum Wall. List. n. 2215, (1899); HKBK. 195; NPfl. 236; Matthew 347, (1911).

Asplenium coreaceum Bory, 1833, non Desv. 1827.

Stipes tufted, 15-23 cm. long, greenish, naked. Fronds 30-45 cm. long, 15-23 cm. broad, oblong-lanceolate, with 6-9 pinnae on each side, which are distinctly stalked, and the lowest 5 cm. apart, 12-15 cm. long, 1.2-2 cm. broad, the point acuminated the edge irregularly crenate, the base gradually truncato-cuneate, equal on both sides, texture coriaceous; colour pale-green; veins inconspicuous, distant, often forked; sori distant, falling short of the edge.

Madras, Ceylon, Formosa, China: Hainan, Yunnan.

19. Asplenium lofouense Christ, Bull. Geogr. Bot. Man. (1910) 142; Matthew 345, (1911).

Stipes ebenaceous, slender, 20 cm. long, opaque, with rachis sparcely clothed with patent lanceolate-subulate scales, 2-3 mm. long, imbricato-lacerate, black at base; lamina 25 cm. long, ovate, 12 cm. broad, pinnate; pinna long stipilate, apex irregularly lacerate, pinnae remote slightly erecto-patent, 5-7 on each side, the lowest ones opposite on a petiole [illegible] cm. long, 7 cm. long, [illegible] cm. broad, oblong-caudate, base cuneate, subunequal, margin lacerato-biserrate with linear protracted teeth; costa slender, black; veins inconspicuous, strongly obliquely forked; sori 6-7 on each side, oblique, medial, sometimes touching costa and sometimes margin, remote, linear, very narrow, to 7 mm. long, unequal; indusium brown, narrow and thin; texture coriaceous-chartaceous, color light green above, glaucous-green below.

Kweichow: Lo Fou.

20. Asplenium wrightioides Christ, Bull. Soc. Fr. 32, 28, (1885); NPfl. 241; Matthew 347, (1911).

Rhizomes? Stipes 12 cm. long, rigid, as thick as raven's quill clothed like rachis in castaneous subulate flaccid brown-reddish minute scales. Fronds lanceolate, 52 cm. long, 12 cm. broad, scarcely decrescent towards base pinnate, the lower almost as long as the middle ones, the apex of fronds shortly acuminate, pinnatifid; pinnae about 27 on each side, close, the lower ones remote, patent, shortly petiolate, ovate-elongate, base equal, cuneate on lower side, erect-truncate on the upper side; pinnae below simple serrate, acuminate apex regularly biserrato-crenate, i. e. lobes about 12, minutely crenato-dentate, costa slender, black; veins in lower lobes pinnate, those of the upper ones forked; sori placed on the upper forking veinlets, about 12, linear, scarcely incurved, oblique not forked, regular, equally long, ([illegible] cm.), not reaching costa or margin, brown, induclum narrow, gray; upper most rachis compressed, almost winged ; texture herbaceous; color light green.

Kweichow.

21. Asplenium crinicaule Hance, Ann. Sci. Nat. v. 5. 254, (1866); HKBK. 208; NPfl. 239; Matthew 344, (1911).

Asplenium hacei Baker, 1867.
Asplenium polytrichum Christ, Bull. Geogr. Bot. Man. 1909, Mem. XX. 172.

Stipes tufted, 10-15 cm. long, firm erect, grayish, scaly below. /
(P. 329).
Fronds 15-28 cm. long, 7.5-10 cm. broad, oblong-lanceolate, with 8-12 horizontal subsessile pinnae on each side, which are 3.8-5 cm. long, about 1.8 cm. broad, the apex acuminate, the margin deeply crenate-dentate throughout, the two sides unequal, the upper one~~s~~ narrowed at nearly a right angle

sometimes auricled at base, the lower ones very oblique truncate; texture subcoriaceous; rachis wingless clothed like the stipe with long lanceolate villose scales with a filiform point; veins obscure, very oblique; sori distant, falling short of both edge and midrib.

India, Hongkong, China: Kwantung, Yunnan, Szechwan - Omei Shan. Very near Asplenium hastatum Lotz. of Columbia, or may be a form of it.

22. Asplenium diminiatum Swartz, Prod. 129, (1788); Mett, n. 183; HKBK; 209; Christ 193; NPfl. 239; Matthew 345, (1911).

Tarachia diminiata Presl., 1849.

Stipes tufted, 15-30 cm. long, blackish, slightly paleaceous, firm, erect. Fronds 15-38 cm. long,? broad, with 6-9 opposite pairs of pinnae, which are 5-7.5 cm. long, 1.8-2.5 cm. broad, the apex acuminate, especially the outer and upper edge sharply inciso-serrate, the lower rounded or cuneate at the base, the lower edge very obliquely truncate, texture coriaceous; rachis dark-colored; firm, slightly scaly; veins closely flabellate and no distinct midrib; sori radiant, narrow, long, linear.

Tropical America, from Cuba to Peru, Hongkong, China: Fukien.

23. Asplenium unilaterale Lam. Enc. 2. 305, (1786); Matthew 347 (1911).

Asplenium resectum Smith, 1791; Mett. N. 103; HKBK. 210; Christ 194; NPfl. 237.
Asplenium amoenum Presl., 1836.
Asplenium marginato-dentatum Zenker, 1851.

Stipes scattered, slender, naked, dark chestnut brown, polished or gray and opaque, 10-20 cm. long. Fronds 15-30 cm. long, 5-10 cm. broad, lanceolate-oblong, with 10-30 subsessile horizontal pinnae on each side which are 1.2-2 cm. long 4-6 mm. broad, bluntish at the apex, all except the truncated part inciso-crenate, the upper half at the base narrowed nearly at right angle; texture thin herbaceous; rachis usually polished like the stem, sometimes green and opaque; veins once or twice forked; sori not reaching either the midrib or edge.

Himalayas, Ceylon, Korea, Borneo, Angola, Guinea Costa, Hongkong, Japan, Formosa, China: Szechwan - Omei Shan, Kwentung, Yunnan, Kweichow, Fokien, Hupeh.

24. Asplenium obscurium Blume, Enum. 181, (1828); Copel. Philip. Journ. Sci. III. 5. 279, (1908); Matthew 346, (1911); v. A. v. R. Malay. Ferns. 467, (1908).

Asplenium serraeforme Mett., n. 75. t. 3. f. 15. 1859; HKBK. 210.

Rhizomes long, slender, creeping, the apex clothed with short lanceolate scales; stipes distinct, to 20 cm. long, erect, greenish like the rachis, scaly at the base; fronds to 30 cm. long, to 12 cm. broad, lanceolate, sometimes 2-pinnate at the base, with more or less 20-30 short-stalked pinnae on each side; pinnae spreading to erecto-patent, the lowest to 6 cm. long, to 2 cm. broad, apex bluntish or acute, the upper and outer edge crenate to toothed, the upper base cuneate, 1/3-½ of the lower side cut away at the base. Texture thin, more or less hyaline, rachis and both surfaces naked; veins commonly once forked. Sori short, occupying the lower part of the anterior veinlets.

Java, China: Kwantung.

(P. 330)

25. Asplenium cheilosorum Kze., Mett. Asplenium 133. n. 104. t. 5. f. 12-13, (1859); Matthew 344, (1911).

Asplenium heterocarpum Wall., List. n. 218, 1828; HK. Sp. 3. 132 t. 175 (1860); Christ 194; N fl. 237 HKBK. 210.

Stipes scattered, 7.5-23 cm. long, firm, erect, chestnut-brown, polished. Fronds 6-15 cm. long 3.8-5 cm. broad with very numerous close-placed dimidiate pinnae on each side, which are 1.8-2.5 cm. broad, 1.8 cm. deep, the lower edge quite entire, the upper broadest towards the base, where it is narrowed suddenly, deeply incised throughout texture pellucido-herbaceous; rachis glossy, chestnut brown, sori 1 or rarely 2 together in the teeth.

Himalayas to Ceylon, Malayas, Borneo, Formosa, China: Hainan, Kwantung.

A very well-marked plant ressumbling is habit a dimidiate Adiantum.

26. Asplenium centrochinense Christ, Bull. Geogr. Bot. Mans. (1904), 111. c. fig.; Matthew 344, (1911).

Fronds 30 cm. long 6 cm. broad; stipes 10 cm. long reddish-brown and so is the rachis. In habit it seems to be a reduced form of the type of Asplenium vulcanicum Bl., differs by much smaller pinnae; 4.8 cm. long, 7 mm. broad, much narrower, linear-lanceolate, acuminate, a little more unequal at base, the upper inner base cut nearly truncate, the lower base almost horizontal cuneate, margin crenate-dentate, teeth cut fairly deep and appressed along the margin; pinnae 18 on each side under the incised apex of the frond; sori oblique, 10 to 12 on each side of the midrib, very regular, extending from costa to margin, 3 mm. long, linear-oblong, brown, indusium brown, narrow.

Kweichow, Kwangsi, Kwantung.

27. Asplenium macrophyllum Swartz, Schrad. Journ. 1800^2. 52, (1801); HKBK. 209, Christ 199; NFfl. 259; Matthew 346, (1911).

Asplenium canaliculatum Bl., 1828.
Asplenium finlaysonianum Wall., List. n. 191, 1828.
Asplenium intergerrimum Wall., 1829.

Stipes tufted, 15-30 cm. long, stout, erect, brownish, nearly naked. Fronds 15-45 cm. long, 15-30 cm. broad with opposite pairs of stalked nearly horizontal pinnae, which are 10-20 cm. long, 2.5-7.5 cm. broad, the point acuminate the edge sharply serrate, the two sides nearly equal, but the lower ones nearrowed rather more obliquely; texture subcoriaceous; rachis naked, firm, erect; veins very oblique; sori in close long parallel lines reaching from the midrib nearly to the edge.

Polynesia, Malayan Peninsular. --- Ceylon, Mauritius, Formosa, Hongkong, China: Kwantung.

28. Asplenium lineatum Sw. Schrad. Journ. 1800^2. 51. (1801); HKBK. 202; Christ 198.

Asplenium nodulosum Klf., 1827.
Darea prolifera Willd., 1810.
Asplenium violascens Moore, 1860.
Asplenium bifida Presl, 1836.

Stipes tufted, 15-23 cm. long, firm, erect, more or less scaly. Fronds 30-60 cm. long, 10-15 cm. broad, oblong-lanceolate, with 20-30 pinnae on each side, which are 7.5-10 cm. long, about 1.3 cm. broad, acuminate at the point, dentate throughout, all sessile or nearly so, the base cuneate, but the lower side narrower and more cut away than the upper; texture herbaceous; colour dark-green; rachis brownish-gray (P. 331).
and slightly paleaceous; veins close, often forked; sori very regular, reaching from the midrib nearly to the edge.

Island Mascarene, bourbon, China: Yunnan.

29. Asplenium wrightii Eaton; Hk. Sp. 3. 113. t. 182, (1860); HKBK. 204; Matthew 347, (1911).

Stipes 30 cm. long, tufted, stout, scaly below. Fronds 45-60 cm. long, 15-24 cm. broad, ovate-oblong, the upper half of the rachis with a narrow wing, 12-20 pinnae on each side, the lower ones 10-15 cm. long, 1.8-2.5 cm. broad lanceolate, subfalcate, the point acuminate, the upper parte sharply and distantly toothed, the lower also cut down into roundish-spathulate lobes, which reach down nearly to the rachis, the base unequal, the lower side only obliquely truncate; texture herbaceous; veins dichotomously forked in each lobe; sori few, not reaching either midrib or edge.

Japan, Formosa, Korea, Hongkong, China: Fukien, Hainan, Kwantung.

Var. fauriei Christ, Bull. Geogr. Bot. Man. 243, (1906).

Pinnae broader, 2½ cm. broad at base, biserrate, sometimes lobed, acute, sometimes acuminate-caudate; sori often reaching the margin.

Swatow, Kweichow.

30. Asplenium septentrionale (L.) Hiffm. Deutschl. Fl. 2. 12, (1795); Mett. n. 122; HKBK. 198; Christ. 201; NPfl. 235; Matthew 347, (1911).

Stipes densely tufted, 7.5-10 cm. long, slender, erect, naked, ebeneous towards the base; fronds simple or cleft from the apex into two or three cuneate divisions, 2.5-3.7 cm. long, 2 mm. broad, with a few sharp lateral and terminal teeth; texture coriaceous; veins forked, subparallel; sori elongated, copious; often at last hiddening the whole under surface.

Norway, Britain, Spain, Italy, Siberia, Himalaya, Rocky Mountain and New Mexico, China: Shensi.

31. Asplenium germanicum Weiss. Pl. Crypt. Fl. Gött. 299, (1770); Forbes and Hemsl. Jour. XXI. 209 (1883); HKBK. 212; Christ 201; NPfl. 235; Matthew 345, (1911).

Amesium germanicum Newm., 1844.
Tarachia germinica Presl., 1781.
Scolopendrium germanicum Roth., 1800.
Phyllitis heterophylla Moench., 1794.

Stipes densely tufted, 5-10 cm. long, naked, slender, ebeneous. Fronds 5-7.5 cm. long, 1.8-2.5 cm. broad, lanceolate, cut down to the rachis lowest of which are again deeply cleft and slightly inciso-serrate towards the point; texture coriaceous; veins obscure, subparalle; sori linear, when mature covering the whole breadth, but falling short of the point of the pinnae.

Scotland, Norway, Hungary, Kashmir, Hongkong.

32. Asplenium sampsoni Hance, Ann. Sci. Nat. V. 5. 257, (1866).

Caudex none; fronds caespitose, densely clad at the base in lanceolate ferruginous-black paleae. Fronds 10-25 cm. long, texture carnosulo-coriaceous, light green, lanceolate, pinnate, sparsely stilate-scaly beneath; pinnae alternate, 2-30-jugated, approximate, oblong, obtuse, shortly petiolate, deeply pinnatifid, the middles ones much the longest,
(P. 332).
about 2 cm. long, gradually decrescent towards the base and apex of the frond, with the short simple undivided apex, the lowerones deflexed, the segments 4-8 on each side, linear,

very obtuse, erect or slightly curved, the upper base usually bifid or cuneate, monosrus; veins solitary to each segment; inducium pale, membranaceous, almost occupying the whole ~~b~~ len~~t~~gth of the segment, stipes about 2.5-5 cm. long, naked, green, compressed, sparcely clad when young in scales beneath.

Closely related to A. tenerum Forst., differs by its lanceolate frond not more than 10 cm. long, under 2.5 cm. broad and its ovate-oblong pinnae only cut down to the rachis at the base.

Canton - West River.

33. Asplenium yunnanense Franch. Bull. Soc. Fr. 32. 28, (1885);
    NPfl. 241; Matthew 348, (1911).

Asplenium castaneo-viride Baker, Ann. Bot. 5; 611. 1830; New Ferns 44.
Asplenium woodsioides Christ, Bull. Soc. Bot. Ital. 261. 1900.

Rhizome shortly caulescent. Fronds caespitose; the base of stipes black, green upward, covered with more or less setaceous paleae; pinnae 20-28 on each side, the upper ones contiguous, the lower ones very widely separate; lamina narrowly lanceolate in outline, decrescent from the middle downward, simple pinnate; pinnae narrow, cut or even pinnatifid at base, lobes 2-3, acute, again 2-3 acutely cleft; the lowest pinnae much reduced; veins simple forked; sori along veins alternate, oblong, inducium whitish, rather firm, margin entire. Fronds shortly stipitate, 15-25 cm. long, scarcely over 2-3 cm. broad; pinnae 12-18 mm. long, 4-5 mm. broad, the lower soriferous ones scarcely broader.

In N. India,? Yunnan, Szechwan, Shensi, Kweichow.

Christenson regarded A. woodsioides Christ as a form of the present species with the pinnae somewhat deeper incised. A. yunnanense itself is a probably a narrow-leafed, less incised variety of A. moupinense.

34. Asplenium praemorsum Sw. Prod. 130, (1788); Christ 204;
    NPfl. 240; Matthew 346, ~~(~~1911.

Asplenium adiantoides Lam., 1786.
Asplenium furcatum Thumb., 1800, mett. n. 161; HKBK. 214, 487.
Tarachia raemorsum Presl., 1849.
Asplenium canariense Willd., 1810.

Rhizomes short with dense fibrous rootlets; stipes tufted, 10-20 cm. long, firm, erect, clothed with deciduous woolly hairs. Fronds 15-45 cm. long, 10-15 cm. broad, with 12-20 pinnae on each side, which are lanceolate-deltoid in general outline, 5-7.5 cm. long, 1.8-2.5 cm. broad, cut down throughout nearly or quite to the rachis into linear-cuneate pinnules,

which are sharply serrated on the upper edge; texture coriaceous; rachis firm, erect, more less fibrillose like the stem; veins deep-channelled, flabellate; sori linear, radiant.

Widely dispersed in tropical and subtropical countries, Formosa, China Yunnan, Hunan, Kiangsi, Szechwan, Kwangtung-Loh Fan Mt.

35. Asplenium sarelii HK. Bakiston, Yang-tze 363-364 (1859).

Asplenium saulii Bak., HKBK. et II. 216; Christ 203; N)fl. 240.
Asplenium blackistoni Bak., 1867, HKBK, ed. I. 216.
Asplenium sepulchrale HK., 1867, HKBK. ed. I. 213.
Asplenium pekinensis Hance, 1867, HKBK. ed. II. 213.

(P. 333).

Stipes tufted, 7.5-10 cm. long, firm, erect, greenish, nearly naked. Fronds 10-12.5 cm. long, 3-7.5 cm. broad, ovate-deltoid with numerous imbricate pinnae, the lowest deltoid, 5 cm long, 2.5-3 cm. broad; pinnules lanceolate, cut down to rachis distinct linear-cuneate-sharp-teethed segments; texture subcoriaceous; rachis firm, naked, veins obscure, one in each segments; sori copious.

India Japan, China: Hunan - Kikung Shan; Kiangsi, Kweichow, Hupeh, Szechwan, Yunnan, Manchuria, Chihli, Shensi Chekiang.

var. alpinum (Christ).

Asplenium pekinense Hance var. alpinum Christ, Bull. Geogr. Bot. Man. XVI, 129, (1906); Matthew 346, (1911).

An intermediate form between Asplenium sarellii and Asplenium yunnanense. Frond much more elongate than the type of Asplenium sarellii, long-attenuate towards the base, dentate, non-aristate, texture coriaceous.

A very distinct form, but there are only two ill-grown specimense of this difficult group of the genus, it is considered desirable for the time being as not to separate it as a specific species.

Szechwan.

36. Asplenium varians Wall., HK. and Grev. Ic. Fil. t. 172, (1830); HKBK. 216; Christ 204; NPfl. 240; Matthew 347, (1911).

Asplenium fimbriatum Kze., 1844.

Stipes tufted, 2.5-7.5 cm. long, slender, naked, greenish. Fronds 10-15 cm. long, 2.5 cm. broad, oblong-lanceolate, with 8-12 pinnae on each side, the lower ones deltoid, 1.2-2 cm. long, 6-10 mm. broad, cut down to the rachis into a few cuneato-flabellate pinnules, the lowest 4 mm. across, sharply toothed on

the outer edge; texture herbaceous, rachis slender, naked, greenish; veins one carried into each tooth; sori copioous, when mature covering nearly the whole under surface of the pinnules.

Africa, Natal, Caffraria, Himalayas, Japan, Ceylon, Hawaii, Formosa, India, China: Yunnan, Hupeh, Kweichow, Shensi, Nanking, Chekiang, Chihli, Anhwei, Shensi.

37. Asplenium tenerum Forst. Prod. 80, (1786); Mett. 60; BKBK. 201; Christ 194; KPfl. 237; Matthew 347, (1911).

Asplenium caudatum Cav., 1802, non Forst. 1786.
Asplenium elongatum Sw., 1806.
Asplenium veichianum Moore, 1848.

Stipes tufted, 10-20 cm. long, firm, erect, greenish, naked; Fronds 30-45 cm. long, 5-7.5 cm. broad with numerous horizontal pinnae on each side, 2.5-3.8 cm. long, 1.2 cm. broad, rounded at the point, truncate at the base on the lower side, regularly cut down throughout to a broadly winged rachis into linear erecto-patent pinnules 1 mm. broad, with their own breadth between them, the lowest usually once forked; texture coriaceous; colour pale-green; rachis compressed; one veins and sorus to each segment, the later marginal.

Malayas, Java, Sumatra, Borneo Formosa, China.

38. Asplenium lushanense C. Chr. Medd. Goteb. Bot. Tradg. 1. 80. Pl. XVI. 4-8, (1924).

A dwarf fern. Rhizome small, almost globose, with dense rootlets and paleaceous apex; leaves few (3-6); stipes very short, (rarely 1 cm. long), sparcely scaly or naked; rachis grayish green. Lamina linear,
(P. 334).
decumbent, attenuate, 3-8 cm. long, 0.4-0.8 cm. broad, strongly herbaceous, glabrous; rachis often prolongated filiform, radicant at apex, bipinnatifid; pinnae distant (to 1 cm. apart), the lower ones gradually diminuated, the middle ones 0.2-0.5 cm. long, 1.5-3 mm. broad, sessile, obtuse, deeply pinnatifid; segments 1-3 on each side, obtuse or acute, apex often crenate-dentate, anterior base sometimes lobulate; sori 1-2 to each segment, quite large, dense and confluent, indusium gray, entire.

Closely related to Asplenium fugax Christ, and Asplenium yunnanense Franch., but the former differs from the present species in having frond of much thinner texture, not narrowed below and the pinnae being flabellately and more deeply cut; from the latter it much smaller, and the minute pinnules remarkably far apart. A. yunnanense is not known to be proliferous.

South Szechwan, Yunnan.

39. Asplenium fontanum (L.) Bernh, Schrad, Journ. 17991. 314;
Mett. N. 119; HRBK. 216; Christ 204; NPfl. 241; Matthew
345, (1911).

Polypodium fontanum L., 1753.
Athyrium fontanum Roth., 1799.
Aspidium fontanum Sw., 1801.
Asplenium halleri DC., 1815.
Asplenium refractum Moore, 1857.

Stipes tufted, 5-10 cm. long, wiry, slender, naked, greenish. Fronds 7.5-1/5 cm. long, 2.5-3.7 cm. broad, oblong-lanceolate, with numerous pinnae on each side, the lower ones short and reflexed, the central ones horizontal, 1.2-1.6 cm. long, 8-13 mm. broad, cut down to the rachis into several stalked pinnules on each side, the lower ones oblong, deeply incised-pinnatifid; texture herbaceous; rachis and upper surface bright green; veins oblique; sori copious, covering nearly the whole under surface of the pinnules.

Europe, central Asia, China: Yunnan, Kweichow.

40. Asplenium monpinense Franch. Pl. David. II. 152, (1887);
Matthew 346, (1911).

A fern 12-20 cm. long, 1.8-3 cm. broad at the middle. Rhizomes very short, apex clothed with long acuminate linear blackish paleae; stipes broadly grooved above, chestnut brown, clothed with very narrow, sparce paleae, 2.5-5 cm. long. Fronds firm, coarse, 7.6-18 cm. long, narrowly lanceolate, distinctly reduced towards the base, subbipinnatifid rachis grooved, mostly greenish above, chestnut brown with hair-like, dense scales below, pinnae 22 on each side, subclose, sessile; pinnules scarcely (not lower ones) distinctly obovate, deeply incised; lobes obtuse upper ones with broady confluent base, 2-3 lobed at apex; veins immersed, pinnate secondary veinlets forked; sori oblong 2 mm. long in straight lines, almost close to the veins, inducium membranaceous, pale, margin slightly undulated.

Yunnan, Szechwan.

May be mere a form of A. incisum or a variety of it, from which it differs according to Christense (cf. Medd. Goteb. Bot. Tradg. I. 81. 1924) by the casteaneous stipe and lower half of the rachis with fine black fibrils and often stiff and more thick leaves than in A. incisum from Japan.

Var. cerae formis Franch. Pl. David. II. 152, (1887).

Large than the type, fronds almost 5 cm. broad toward the middle; pinnae deeply partite lobes oblong, apex bilobulate, equal, the lowest ones almost free, ovate, incised. (f. 355).

Yunnan, Szechwan.

It is perhaps a distinct species.

41. Asplenium woodsioides Christ, Bull. Soc. Bot. Ital. 261, (1900).

Leaves to 15 cm. long, shortly stipitate (stipes 3-4 cm. long), stipes and rachis extends as high as over the middle of the frond shaded dark-brown. Lamina bipinnatisect, lanceolate, acuminate; the inferior pinnae strongly remote, and reduced to very short auricles on each side, the middle ones 1 cm. long, 4 cm. broad, petiolate, broader from the base, deltoid-oblong, obtuse, inferior side at the base, deeply incised down to the costa towards the base on each side; lobes cuneato-ovate, 2 mm. broad, irregularly dentate, teeth acutish, several in a group, not bifid or aristate. Sori very dense, short, 1 mm. the whole under surface upon maturity; indusium very thin, grey, fugaceous broadly oval, margin subentire; texture herbaceous, color obscure green entire plant glabrous. Shensi

From A. fontanum the species differs by atrateous rachis, less divided pinnae, broader obtuse lobes and less acute teeth; from A. sarellii differs by atratous rachis, broader obtuse lobes being not cut and teeth being not aristate.

42. Asplenium incisum Thunb. Tr. Linn. Soc. 2. 342, (1794); FKBM. 217; Christ 203; NPfl. 241; Matthew 345, (1911).

Asplenium trichomanes Thub., 1874.
Asplenium elegantum HK. 1850.

Stipes tufted, 2.5-7.5 cm. long, polished, chestnut-brown; fronds 15-30 cm. long, 3.7-5 cm. broad, with numerous pinnae on each side, the lower distant, blunt and much reduced the central ones lanceolate-deltoid, - 1-2.5 cm. long, 0.6-1.2 cm. broad, cut down to the rachis into numerous ovate-rhomboidal pinnule, much truncate at the base on the lower side and deeply inciso-pinnatifid; texture thinly herbaceous; rachis greenish above, compressed, flaccid; veins flabellato-forked one to each tooth falling short from the apex; sori linear-oblong, one to each vein.

A species widely dispersed in Japan, Tsus-sima, Chusan, China: Shensi, Kansu, Shantung, Szechwan, Hupeh, Kweichow, Kiangsi, Fukien, Chekiang, Yunnan, Manchuria, S. Anhwei, Kiangsu, Chihli, Hunan.

43. Asplenium fugax Christ, Bull. Soc. Fr. 52 Mems 1, 53, (1908); Matthew 345, (1911).

Rhizomes short, radicose, clothed with subulate atratous scales; leaves tufted; stipes filiform, dark-brown, smooth, upper part plane 3 cm. long; lamina 4 cm. long, 1 cm. broad, lanceolate, not attenuate towards the base; apex caudate, gemiferous at the tip, bipinnate; pinnae sessile, ovate-

palmate, segments 3- or 4, 2 cm. long, ovate-cuneate, acute, subpetiolate, often bifurcate, veins in segments solitary, clavate, not extending to the apex; sori solitary on segments, medial, broad ovate, [illegible] mm. long; inducium gray, persistent, rounded-ovate, texture thin herbaceous.

Kweichow, Yunnan, Szechwan.

44. Asplenium interjectum Christ, Bull. Geogr. Bot. Man. 241, (1902); Matthew 345, (1911).

Rhizomes short, stipes fasciculate, castaneous below, the upper part and rachis green, slender, 8 cm. long. Fronds deltoid, 7 cm. long, 7-4 cm. broad, acuminate, bipinnatifid; pinnae 3-4, pinnatifid below the apex, petiolate, patent, deltoid, the lowest ones pinnate,
(P. 336).
i. e. with 1 or 2 subsessile pinnules, the middle and upper deeply pinnatifid, ultimate lobes close, 2/3 or 1 cm. long, [illegible] cm. broad, obovate-rounded, cuneate, coarsely dentate-crenate; texture opaque, herbaceous; veins flabellate; sori 4 mm. long, large, very dense, rufo-brown, confluent over entire lobes.

Kweichow.

45. Asplenium latecuneatum Christ, Bull. Geogr. Bot. Man. (1909), Mem. XX. 171; Matthew 345 (1911).

Rhizomes oblique, radicose, clothed with subulate opaque light-brown scales [illegible] cm. long; leaves scarcely fasciculated; stipes 20 cm. long, lead-stramineous, whole plant naked; rachis subulate towards apex, thick as raven's quill. Lamina 38 cm. long, 12 cm. broad, bipinnatifid, acuminate, ovate-oblong, base scarcely narrowed; pinnae petiolate, about 16 on each side, erect, the lower remote, unequal, i. e. the pinnule on the upper side of the base much the largest, subdeltoid, acuminate-ovate, 9 cm. long, 3 cm. broad, cut into a broad wing, lobes ovate, obtuse, about 10 under the serrated apex, the lowest ones 2 cm. long, 8 mm. broad, biserrate, veins in lobes pinnate, sori much oblique, 4-6 to a lobe, ovate-lanceolate, 2-3 mm. long, obtuse, light brown, inducium very narrow, gray; sori evanescent.

Differs from Asplenium cuneatum by the costa of pinnae with a very broad wing and lamina bipinnatifid sometimes tripinnatifid.

46. Asplenium pellucidum Lam. Enc. 2. 305, (1786); Mett, n. 135.

Asplenium hirtum Klf., 1824; RKBr. 205; Christ 169; NPfl. 236.

Asplenium induratum Hooker, 1861.

Stipes firm, erect, 15-30 cm. long, straw-coloured, clothed

at the base with large lanceolate-acuminate, reddish-brown scales. Fronds 30-60 long, 15-30 cm. broad, lanceolate with several distinct pinnae on each side which are 10-20 cm. long, 2.5-5 cm. broad; pinnules lanceolate some times auricled on the upper side, on the large forms again pinnatifid, tooth mucronate; texture subcoriaceous; rachis firm, naked, straw-coloured; veins regularly pinnate, sori in two rows on the pinnae or pinnules, midway between the midrib and edge; inducium reniform.

Himalayas, Java, Philippines, Hongkong, China.

A variable species in size and cutting, the midrib of the pinnae often spinulose on the back, inducium more like that of Aspidium g Lastrea.

47. Asplenium ruta-muraria L. Sp. 2. 1081, (1753); Mett. n. 126; HKBK. 213; Christ, 202; NPfl. 240; Matthew 317, (1911).

Acostichum ruta-muraria Lam., 1704.
Scolopendrium ruta-muraria Roth., 1800.

Stipes tufted 5-10 cm. long, slender, wiry, naked, ebeneous toward the base. Fronds 2.5-5 cm. long, about 2.5 cm. broad, deltoid, cut down to the rachis into a few pinnae on each side, the lower ones again cut down into spathulate-cuneate pinnules, which are serrated round the outer edge; texture coriaceous; rachis firm, green, naked; veins flabellate; sori copious.

(P. 337).
Europe, Asia, East America, N. W. India, China: Manchuria, Szechwan.

48. Asplenium adiantum-nigrum L. Sp. 2. 1081, (1753); HKBK. 214; Christ 202; NPfl. 240; Matthew 344, (1911).

Asplenium nigram Lam., 1778.
Asplenium argutum Klf., 1824.
Asplenium serpentini Tausch., 1839; Christ 203.

Stipes tufted, 15-23 cm. long, nearly naked, polished, chestnut-brown. Fronds 15-30 cm. long, 10-15 cm. broad, subdeltoid, with numerous pinnae on each side, the lower ones deltoid, 5-7.5 cm. long, 3.8-5 cm. broad, cut down to a compressed winged rachis into numerous lanceolate-deltoid pinnules, truncate on the lower side cut down nearly or quite to the rachis into oblong or spathulate segments, sharply toothed round the outer edge; texture coriaceous; rachis polished and chestnut-colored below, upwards winged and compressed; veins obscure, oblique; sori copious, at last often occupying the whole under surface of the segments.

Europe, Africa, Himalayas, Reunion, China: Kansu, Kweichow.

Recently known in China.

49. Asplenium laciniatum Don, Prod. Flor. Nepal. 4 8, (1825)
HKBk. 221; NPfl. 239; Matthew 545, (1911).

Asplenium caespitosum Wall., 1828.
Asplenium planicaule Wall., 1828; Mett. n. 158; HkB.
211; NPfl. 239.

Asplenium truncatum Don, 1836.
Tarachia truncatum Presl., 1849.

Stipes tufted, 10-20 cm. long, firm, erect, grayish, often scaly. Fronds 15-30 cm. long, 5-7.5 cm. broad, with 12-20 stalked horizonal pinnae on each side, which are 3.5-5 cm. long, 1.2-1.5 cm. broad, the point acute, the edge cut down nearly or quite to the rachis in the upper part into stalked ovato-rhomboidal lobes, which are deeply toothed round the outer edge, the lower side very much truncated at the base; texture subcoriaceous; rachis firm, compressed, grayish; veins very oblique; sori falling short of the edge.

Himalayas, Japan, Formosa, China: Yunnan, South Anhwei, Chekiang.

50. Asplenium saxicola Roks., Fedde Repert. 13. 122, (1914).

Rhizomes shortly creeping, palcae about 4 mm. long, 1 mm. broad, dark-brown, narrowly lanceolate, subulate-acuminate, entire or rarely provided with solitary cilia; stipes to 20 cm. long, about 2 mm. thick, clad in similar paleare as in rhizomes but densely ciliate (denser down-ward). Lamina to 15 cm. long, 4½ cm. broad, linear-oblong, shortly acuminate, coriaceous, subglaberous or slightly paleaceous, fibrillose beneath, pinnate; pinnae about 12 on each side, patent, the lower ones opposite, the rest alternate, petiolate, unequal at base, the upper base, the upper base truncate the lower narrowly cuneate, trapizoid or deltoid-rhombic below, acuminate, rarely obtuse, the lower ones and also middle ones to 3 cm. long, 12 mm. broad at base, irregularly inciso-lobed, the upper ones subentirs, lobes few, obovate-turncate, upper side coarsely dentate-crenate, sometimes the upper basal lobes free, much the largest, about ½ cm. long, ¾ cm. broad, rhachis badious downward, green upward; veins flabellate, prominent on both sides; sori borne from costa to margin covering the whole under surface, indusium linear, whitish-brown, firm.

Kweichow.

(P. 338).
line Allied to Asplenium adianthoides (L.), but distinguished itself by its short, broadly lobed pinnae, thicker veins, etc.

51. Asplenium comptum Hance, Ann. Sci. Nat. V. 5. 255, (1866);
Kuhn, Bot. Zeit. 131, (1869).

Caudex short, subrounded, densely clothed in black paleae.

stipes blackish-green, 7.5-15 cm. long, paleaceous at the base, smooth upward. Frond 10-15 cm. long, ovate-lanceolate in outline, texture carnoso-coriaceous, rigid, shining straw-green above, paler beneath. Pinnae 2-5-jugated, the lower ones usually subopposite, the upper ones alternate, petiolate, all trapezoid-ovate from the base, acute or obtuse 2.5-3.7 cm. long, the lower ones much the largest, trilobed, with the lateral lobes cuneato-obovate, obtusish, irregularly eroso-dentate, the terminal lobe much the largest, again divided into trapezoid acute lobules with eroso-dentate margin, the rest gradually decrescent and much less deeply lobed, the apical one pinnatifid, with the lower pinnules slightly confluent, the inferior base concave or rather straight, the upper base truncate or rounded; veins in the lobes flabellate, simpel, usually forked, conspicuously striated. Inducium linear, confert, borne slightly above the base of the lobules, pale, membranaceous.

Canton: West River.

Near A. macrophyllum Sw., differs by thick texture, the shape of pinnae and particularly by short sessile terminal pinna.

52. Asplenium longkonse Ros. Fedde Repert. 13. 125, (1914).

Rhizomes erect, covered at apex with epaleae which are sorbid brown, lanceolate, shortly acuminate, entire, about 4 mm. long, $\frac{2}{3}$ mm. broad at base; stipes fasciculate (3-5), subflexuous, grayish-green, shining castaneous brown downward, about 20 cm. long 1 mm. or slightly thicker, the whole plant very glabrous. Lamina deltoid-ovate, shortly acuminate, thin herbaceous, light green, tripinnate, about 17 cm. long and as broad; primary pinnae about 4 on each side below the pinnatifid apex, alternate, suberect patent, petiolate (the petioles in the lowest pinnae about 1 cm. long), the basal ones much the largest about 9 cm. long, 6 cm. broad, unequal at base, lower side rounded-excised, the upper most ones gradually diminished and more simple, apex subentire, trapezoid-ovate, margin inciso-dentate; the secondary pinnae about 3 on each side, similar to the primarypinnae but obtuse, the basal ones about 3½ cm. long, 2½ cm. broad, 1-2 pinnules free, apex trilobed or entire; lobes cuneate, ovate, obtuse-denticulate except the base which is entire, the veins in the lobes flabellate-pinnate, short from the margin and scarcely extending into the teeth; sori oblique, linear, subflabellate, the largest ones to 6 mm. long, inducium linear, membranaceous, whitish.

Kweichow: Gan-chuen, Long-Za.

53. Asplenium cavalerianum Christ, Bull. Geogr. Bot. Mans. (1909), Mem. IX. 173; Matthew 344, (1911).

Stipes angular, thick as quill, lurid, opaque, 20 cm. long, clothed at the lower part with ovate-acute opaque brown

scales 5 mm. long. Fronds oblong-elongate, 50 cm. long, long-acuminate, 15 cm. broad, moderately angusted, towards base subtripinnatifid, rachis sordid-green, furfuraceous; pinnae about 18 under the serrated apex, the lower ones much remote (6 cm. apart), alternate, erecto-patent, petiolate, (petiole 1 cm. long), deltoid-oblong, base unequal, broadened on the upper side, 10 cm. long, 3.5 cm. broad, costa prominently winged,
(P. 339).
wing 2-3 mm. broad; pinnules petiolate, ovate-deltoid, base cuneate, subunequal, broadened on the anterior side, about 12 on each side under a serrated apex, the lower ones 2.5 cm. long, 1 cm. broad, acute, coarsely and acutely dentate; veins slender, pinnate in pinnules, oblique; sori medial, almost one to a lobe, ovate, short, 2 mm. long, brown, indusium flaccid, gray, involute; texture herbaceous, color light green, both surfaces naked.

54. Asplenium affine Sw. Schrad. Journ. 1800². 56, (1801);
HKBL. 215; Christ 205; NPfl. 240.

Asplenium spathulium J. Sm., 1841.
Asplenium pygmaeum HK., HKBL. 196.
Asplenium gilpinae Baker, 1877.
Asplenium herpetopteris Baker, 1877.

Stipes 15-37 cm. long, firm, erect, gray, nearly naked. Fronds 30-45 cm. long, 15-30 cm. broad, with numerous pinnae on each side, the lower ones lanceolate-rhomboidal, cut down to the rachis into numerous distinct rhomboid pinnules 7.5-15 cm. long, 2.5-5 cm. broad, which are again inciso-serrated, or deeply lobed; texture subcoriaceous; rachis firm, naked; veins subflabellate; sori copious, linear.

Ceylon, Philippines, Borneo, Fiji, Sandwich Island, China: Kweichow.

Var. sinense Christ, Bull. Geogr. Bot. Man. 245, (1906).

Pinnae shorter, pinnules free only in the upper base of pinnae the upper pinnae pinnatifid.

Hongkong, China: Yunnan.

55. Asplenium cuneatum Lam. Enc. 2. 309, (1786); HKBL. 214;
Christ 204; NPfl. 240; Matthew 344, (1911).

Tarachia cuneata Presl., 1849.
Asplenium Cristatum Brack., 1854, non Lam. 1786.

Stipes tufted, 15-23 cm. long, firm, erect, naked. Fronds 15-37 cm. long, 15-23 cm. broad with numerous spreading pinnae

on each side, the lower ones 7.5-10 cm. long, 2.5-3.7 cm. broad; lanceolate-deltoid, cut down to the rachis into several distinct ovate-cuneate pinnules, which are inciso-dentate and cut down in the lower part nearly or quite to the rachis; texture subcoriaceous; rachis firm, grayish, nearly naked; veins fine, conspicuous on the upper surface; sori linear, subflabellate.

Tropical America, West Indian to Brazil, Polynesian Islands to Java, Formosa, Hongkong, China: Hainan Kweichow Fokien, Kwantung.

56. Asplenium laserpitiifolium Lam. Enc. 2. 310, (1786); Mett. n. 165; HKBK. 215; Christ 208; NPfl. 240; Matthew 345, (1911).

Tarachia laserpitiifolia Presl., 1849.

Stipes tufted, 15-30 cm. long, firm erect, greyish, naked. Frond 60 cm. to 1.33 m. long, 15-45 cm. broad with numerous pinnae on each side the lowest deltoid-lanceolate, 15-25 cm. long, 10-15 cm. broad, cut down to the rachis into numerous distinct pinnules, the lowest with rhomboidal-cuneate segments, again deeply pinnatifid; texture herbaceous; rachis slender, naked; veins fine to deeply channelled; sori short, linear-oblong, irregular.

N. America, Polynesian Islands, India, Chusan, Assam, Formosa, China: Hainan, Canton; Chekiang, Fukien.

(P. 340).
57. Asplenium wilfordii Matt., Huhn. Linn. 36. 94, (1869); HKBK. 487; Matthew 347, (1911).

Asplenium japonicum Thunb. var. oldhami Bk., HKBK. 235.
Asplenium oldhami Hance, Ann. Sci. Nat. v. 5. 256, (1866); Matthew 346, (1911).

Rhizome stout, short creeping; basal scales dense, linear-subulate, castaneous; stipes 10-20 cm. long, greenish, naked. Fronds 15-30 cm. long, oblong-lanceolate, tripinnatifid; rachis green, flattened upwards; pinnae close, deltoid, ascending, stalked, many lower subequal, 1.8-3.1 cm. broad, cuneate-truncate on lower side at base; lower tertiary segments cuneate, 2-4 mm. broad, deeply flabellato-pinnatifid with sharply toothed lobes, each tooth 1-veined; texture subcoriaceous; surface dull green, naked; veins flabellate, fine, distinct; sori medial, irregular, 1-2 mm. broad.

Japan, Korea, China: Kweichow, Kiangsi.

58. Asplenium grandifrons Christ, Bull. Boiss. 6. 959, (1898); 7. 9. (1399); Matthew 345, (1911).

Ample fern; caudex....?; stipes 80 cm. long, thick as a small finger near base and deeply sulcate, grayish-green, cloth-

ed on the lower part with sululate dark brown scales over 1 cm. long, the upper part and the rachis glabrous. Fronds over 1 m. long, 30 cm. broad, elongato-ovate with much acuminate apex, tripinnate or quadripinnatifid; pinnae remote, the lowest ones not reduced, almost 10 cm. apart, alternate, petiolate, triangular-deltoid; the upper pinnae lanceolate, the upper rachis in superior pinnae winged from base, pinnules ovate, segments of 3rd. and 4th. orders unequally and b/roadly cuneate, obtuse, but acutely crenate; veins forked; sori very dense, oblong, 2-4 mm. long, turgid, placed on lobes from costule to margin; inducium strong, gray.

59. Asplenium rhachidosorum Hand.-Mzt. Symb. Sinic. VI. 33, Pl. 2. f. 2. (1929).

Rhizome ascending, 5 mm. thick, sparcely covered in black paleae, which are lanceolate, to 5 mm. long, 0.5-0.8 mm. broad, apex long subulate-acuminate, margin sparcely denticulate. Frond 76-80 cm. long, Stipes 31.5-34 cm. long, quadrangular, fuscous at the base, paler upward, covered laxly at the base with similar but larger and paler scales, naked and glabrous upward. Lamina lanceolate, gradually long-acuminate, 44.5-46 cm. long and about 11 cm. broad, tri- or quadripinnate, finely acuminate towards the apex, texture herbaceous, obscure green above, slightly paler beneath. Rachis sulcate above and convex below, pale greenish towards the tip. Pinnae about 38 pairs, patent, or usually slightly forwardingly curved towards the apex, long-lanceolate gradually long-acuminate, to 12.5 cm. long, 3.5 cm. broad, gradually decrescent towards the apex, bi- or subtripinnate. Pinnules to 27 pairs, patent at 60 degrees from the secondary rachis, usually slightly fo/rwardingly curved, the lowest generally smaller than the rest, simply or subbipinnate, to 2.7 cm. long, and 7 mm. broad, covered at the axils above with ferruginous long acuminate adpressed scales, 2 mm. long. Segments to 14 pairs, narrowly patent and slightly forwardingly curved, lanceolate in outline, to 4.5 mm. long, 1-2 mm. broad, very deeply incised into 3-7 lobes. The ultimate lobes to 2.5 mm. long, and 0.8 mm. broad, linear, acute, apex sometimes bi- or trifid. Veins fine, sparcely pinnate, ferruginous. Sori ellipsoid, borne on the base of segments, near the costa. Inducium semiorbicular, thin, dentate, olive-colored. Sporangia long stipitate, ferruginous annulus pale-colored.

(P. **541**).
60. Asplenium tenuissimum Hayata, Ic. Pl. Form. 4: 228 f. 158, (1914).

Rhizomes ere/ct, slender and very short. Stipes tufted, quite smooth, very slender, 15 cm. long, shining, channelled-plane, green above, much convex and black-red-purplish below, clothed with shining sparce scales, scales on the lower portion cuspidate, 3 mm. long, base 1 mm. broad, those on the upper portion linear, piliform, 2-3 mm. long, reddish-purple. Fronds very slender and thin, herbaceous, brilliantly green, lanceolate, apex acuminate, base truncate, 25 cm. long, 7 broad,

tripinnate or tripinnatifid, pinnae oblong-lanceolate the lower ones longer, the lowerst ones slightly shorter, the middle ones 1½ cm. apart from each other, forming an angle of 70°-80° with the rachis, divaricate, oblong or oblong-lanceolate, apex obtuse, base acute or oblique truncate, 3 cm. long, 1½ cm. broad, the upper side broader than the lower; the lowest pinnules on the upper side 1-2 mm. remote from the axis, 5 mm. apart from each other, oblong, apex obtuse, base acute, 1 cm. long, 6 mm. broad; the secondary pinnules oblong, entire, or 2-3-lobed, apex acute, base cuneate, 3-4 mm. long, 1-2 mm. broad, sori single on secondary pinnules, crescent-shaped, 1½ mm. long.

Formosa, recently recorded from Hainan.

Near A. tenuifolium Don, differs by narrower fronds with much remoter pinnae.

61. Asplenium tenuifolium Don, Prod., Fl. Nepal. 8, (1825); Mett. n. 95; HKSK. 220; Christ 205; KPfl. 241; Matthew 347 (1911).

Stipes tufted, 7.5-15 cm. long, slender, naked, slightly ebeneous. Fronds 15-30 cm. long, 7.5-12.5 cm. broad, oblong-lanceolate, with numerous pinnae on each side, the lower ones 5-7.5 cm. long, 1.2 cm. broad; lower pinnules subdeltoid, cut down to a narrowly winged rachis into spathulate segments, 0.3 cm. broad, sharply incised on the outer edge; texture thin herbaceous; rachis green, naked, slender; veins solitary; sori 1 or 2 to each segment, placed on the disk.

Ceylon, Malayan, Pinninsular, India, China: Yunnan, Kweichow.

New to China.

62. Asplenium coenobiale Hance, JoB. 142, (1874); Matthew 344, (1911); Hand.-Mzt. Symb. Sinic. 33, (1929).

Asplenium fuscipes Baker, JoB. 304, (1879).
Asplenium billettii Christ, Bull. Sci. France et Belg. 28. 267 t. 12. f. 4-5. 1898.

Stipes 7.5-10 cm. long, wiry, flexuose, dark ebeneous naked. Fronds lanceolate-deltoid, tripinnatifid, broadest at the base, 7.5-10 long, 3.2-3.7 cm. broad, moderately firm in texture, green and glabrous on both side, rachis slender, brown below, green above; pinnae subsessile, crowded, lanceolate-deltoid, cuneately excised on the lower side at the base, cut down to the rachis into contiguous sessile rhomboid deeply pinnatifid secondary segments, with linear-oblong 1-nerved tertiary lobe; sori 6-18 mm. long, linear-oblong, touching the costule of the pinnules, but falling short of the tip of the tertiary lobes.

Hongkong, China: Yunnan, Kwantung, Kweichow.

In habit, it allies to A. tenuifolium, differs by dark ebeneous stipes, short deltoid frond and somewhat thicker texture.

63. Asplenium davallioides Hooker, JoB. 9. 343, (1857); HKBk. 222. Christ. 209, NPfl. 242; Matthew 344, (1911).

Humata dareoidea Mett., 1859.

(P.342).

Stipes tufted, 7.5-10 cm. long, firm, naked. Fronds 7.5-15 cm. long, 5-7.5 cm. broad, deltoid, quadripinnate with 6-9 pinnae on each side, the lowest much the largest, 5-7.5 cm. broad, deltoid with a broadly-winged rachis and lower segments again pinnatifid, with curved divaricate lateral divisions, 2-3 mm. long, 1 mm. broad; texture thick, coriaceous; color bright green; rachis compressed, veins one to each division, sori copious, quite lateral, oblong, often occupying the lower side of the ultimate divisions.

Japan, Tsus-sima, Loochow, Hongkong, Formosa, Korea China: Fukien.

Nearest to Davallia in general habit.

64. Asplenium belangeri Kunze, Bot. Zeit. 176, (1848); HKBk. 223; Christ 208; NPfl. 242.

Asplenium tenerum var. belangeri C. Chr., Ind. 134, (1906).

Caudex short, stout, erect, stipes densely tufted, 10 cm. to a span long, compressed upward, greenish. Fronds 30-45 cm. long, narrow-oblong (the sides almost forming a parallelogram), acuminate only at the apex, sparcely stellate-squamulose beneath, here and there proliferous, subchartaceous, pale green, bipinnate, primary pinnae from 2.5-5 cm. long, horizontally patent, singularly uniform in the whole length, linear obtuse, nearly sessile, again pinnated (or they may be said to be deeply pinnatifid), pinnules or segments 4-6 mm. long, linear-clavate or sup-spathulate, obtuse, straight a little curved, decurrent, with in the rachis simple monosorous, or the lower superior one is bifid or subpinnatifid, veins solitary, central, sori large, conspicuous, occupying nearly the entire length of the pinnules, marginal; indusium is of the same color and texture of the frond; main rachis compressed, distinctly winged.

Malay Peninsula, Java, Sumatra, Borneo, China:

Christensen reduced this species to a variety of A. tenerum Forst, but to me it is very distinct on account of its frond being bi-pinnate at least on the lower part.

65. Asplenium prolongatum HK., Sp. 3. 103, (1860); 2nd. Cent. Ferns. t. 42, 1860.

Asplenium achilleifolium C. Chr., Ind. 99, (1905); Matthew 344, (1911).

Adiantum achilleifolium Lam., 1783.
Asplenium rutaefolium Kunze, 1836; HKBK 22; Christ 208; NPfl. 242.
Asplenium rutaefolium var. prolongatum Diels, 1907
Asplenium stans Kze., 1859.
Caenopteris rutaefolia Berg., 1786.

Rhizome small, inclined rooting; stipes tufted, 15-23 cm. long, compressed, greenish, naked. Fronds 15-37 cm. long, 5-7.5 cm. broad, with 12-20 pinnae on each side, the lowest subdeltoid, 5 cm. or more long, cut down to the rachis into numerous serecto-patent distant pinnules on each side, the lowest on the upper side again cut down into erecto-patent linear segments; the lowest on the under side suppressed; texture rather fleshy-coriaceous; rachis compressed; colour pale-green; sori small, marginal.

Cape Colony. Natal Land, Himalayas, Ceylon, Japan, Hongkong, China: Fukien, Hainan, Kwantung, Szechwan, Yunnan, Hupeh, Chekiang-Yung-tan Shan.

(P. 343).
66. Asplenium finlaysonianum Wall., HK. Ic. Pl. t. 437 (1854); HK. BK. Syn. Fil. 245; Christ Farnkraut. Erde. 199; Diels in Nat. Pfl. Fam. 1. 4, 239; C. Chr. Ind. II (1906); v. A. v. R. in Malaya. Ferns 376 (1908).

Rhizome short, thick, obliquely ascending, densely clothed in rigid blackish lanceolate scales; stipes 15-23 cm. long, green, subcompressed densely clothed near the base in the scales similar to these on the rhizome, the upper part and rachis subglabrous or clothed in blackish subulate-lanceolate scales; fronds 20-45 cm. long, 10-20 cm. broad, simply pinnate under an entire or subrepand or 3-lobed terminal pinnae which is much the largest, lateral pinnae, 1-6 subopposite or alternate the lower ones somewhat larger than the ones next above, 7-12 cm. long, 2-4 cm. broad, the point very acuminate, the base equal or subequal, very gradually narrowed on both sides to a distinct petiole, the edge entire or subrepand; texture subcoriaceous or chara/taceous; veins subflabelate, very oblique, slightly anastomosing towards the edge, sometimes bounded by an irregular intramarginal line; sori often 3.5-5 cm. long, scattered irregularly, near the costa, but falling far off from the margin.

India, Malaya, China: Yunnan.

evidently rather are plant in China, so far recorded only from Yunnan Augustine Henry.

67. Asplenium sepelunceae Christ, Bull. Geogr. Bot. Man. 113 c. fig. (1904); Matthew 347, (1911).

Rhizomes short, covered with black, subulate scales; leaves about 10, caespitoso-rosulate, decumbent, stipitate or

elongato-ligulate, obtuse, base cuneate, rarely subcordate, 5 cm. long, 1 cm. broad, margin incrassate or entire or irregularly undulato-lobed, lobes rounded, numerous, part are shortly and part more deeply lobed; veins hidden, once foked in lobes, clavate at apex towards margin, soriferous on the anterior veinlets, sori numerous, strongly oblique, sometimes touching costa, sometimes margin, dense, lanceolate, close, brown, 2½ mm. long, inducium thin, gray; plant glabrous, of an opaque, papyraceo-coriaceous texture, dusky-colored.

Kweichow: Pin-fa.

Tribe IX Polypodieae

Sori dorsal or terminal on the veins, punctiform, round or oblong or linear and then either oblique or parallel to the costa or the margin. Stipes articulate to the rhizome. Segments equal at both sides of the base. Veins anastomosing or pinnate or forked and free.

Key to genera

1. Coenosori borne on specific receptacles on the anastomosed veins, one on each side of the midrib, marginal, medial or costular, always parallel to the margin and costa. Fronds usually dimorphous and simple.

2. Fronds dimorphous; surfaces and sori mixed with stellate or branched hairs......59. Drymoglossum

2. Fronds dimorphous or uniform; surfaces and sori without stellate or branched hairs.

3. Sori mixed with peltate scales or with filiform paraphyses.

4. Fronds uniform, the fertile ones with a contracted apical fertile spike...60. Hymenolepis

4. Fronds dimorphous, the sterile ones orbicular, obovate or elliptical; the fertile linear or narrowly spathulate..61. Lemmaphyllum

4. Fronds uniform, the fertile ones not with a spike-like apical contracted fertile portion, but the linear sori immersed or covered by the strongly revolute edge.....62. Drymotaenium

3. Sori without scales and paraphyses; leaves dimorphous, the fertile ones very contracted, linear...............................63. Myuropteris

1. Sori not coenorial but in distinct punctiform, round or oblong clusters or linear and then running parallel to the main lateral veins, but strongly oblique to the costa and margin; many on each side of the costa, no special reticulate-veined receptacle is present. Fronds usually uniform, simple or variously divided.

2. At least the under surface covered with scattered or more or less densely corded stellately branched hairs.........64. Cyclophorus
2. Fronds naked or scaly, not rarely hairy, but then the hairs simple. not stellate.
    3. Fronds strongly dimorphous. Barren frond sessile, oakleaf-like, afterwards brown and rigid; fertile ones stipitate,
    3. pinnatifid or pinnate.............65. Drynaria
    Fronds uniform or dimorphous, if dimorphous the barren fronds not as in Drynaria. Spori punctiform, round, oblong, or linear and then parallel to the main veins, but oblique to the costa and margin, many on each side of the costa....65. Polypodium

59. Drymoglossum Presl. Tent. Pterid. 227, (1836);
C. Chr. Dansk Bot. Arkiv. 6: 3. 83, (1929).
(Pteropsis Desvau, ex parte).

Type: Pteris piloselloides L.

Rhizome wide-creeping, ageotropical, the scales peltate, mostly ciliate. Leaves simple, entire, thick, succulen, when young rather densely clothed with stellate hairs, decidedly dimorphic; veins immersed, anastomosing and forming-oblique areolae with or without free veinlets;
(P. 345).
principal lateral veins indistinct, sporangia borne on a linear receptacle, intermixed with or surrounded by stellate hairs. Spores coarsely or echinulate. (Greek, "wood" and "tongue", of direct significance).

A small genus of 6 more or less related species, confined to Tropical Asia, 1 recorded from China:

This genus according to the old conception contains about 20 heterogenous species, but it has been throughly rewor-ked over and divided into 6 genera by C. Christensen (cf. Dansk Bot. Arkiv. 6. 3. p. 1-93, 1929).

Key to species

I. Receptacle medial, covering the whole under surface of the fertile leaves.....................1. D. heterophyllum
II. Receptacle supramedial or submarginal, sporangia forming linear marginal coenosori, leaving the central portion of the surface uncovered...............
.....................................2. D. piloselloides

1. Drymoglossum heterophyllum (L.) Trimen, Journ. Linn. Soc. 24: 152, (1877); C. Chr. Ind. 246, excl. most synonymus (1905); C. Chr. Dansk Bot. Arkiv. 6: 3. 84 Pl. XII. f. I, 6; XIII. f. 3. (1929).

Acrostichum heterophyllum L., 1753.
Pteris piloselloides Houtt., Nat. Pfl. Syst. ed. germ.
13^{1}: 101 pl. 96. f. I, 1786.
Pteris elliptica Willd., 1810.
Pteropsis elliptica Desv., 1827.
Drymoglossum ellipticum Moore, Ind. XXII. 1857.

Rhizomatic scales reddish-brown, less densely lacerato-fimbriate and when young with an subentire acuminate tip, deciduous, the older rhizomes being almost quite naked. Sterile leaves orbicular, 1-1.5 cm. long and broad, or obovate or elliptical, up to 3 cm. long; fertile ones narrowly spathulate, 5-8 cm. long, 3-4 mm. broad, attenuated downward nearly to the phyllopodium, the tip broadly rounded. Coenosori confined to the upper two-thirds or more of the blade, the sporangia borne on vaulted receptacle medial between the midrib and the revolute margins, covering the whole under surface and mixed with petiolate stellate hairs. Spores coaese~~l~~ly verrucose, the prominences obtuse or acute, not close. Both sides of the blade stellato-pilose, the hairs with rather long branches, deciduous and mostly abraded in the specimens.

Ceylon, South India, Cochin-china, China: Kwantung, Hainan.

2. Drymoglossum piloselloides (L.) Presl. Tent. Pterid. 227 pl. 10. f. 5-6, 1836; C. Chr. Dansk Bot. Arkiv 6: 3. 86 pl. XII. f. 4-5; XIII. f. d. (1929).

Pteris piloselloides L., 1753.
Drymoglossum heterophyllum pro parte C. Chr., Ind. 246, 1906, Nakai, Bot. Mag. Tokyo 40: 390, 1926.
Drymoglossum rotundifolium Presl, Epim. 157, 1849; Nakai l. c. 388. c. fig.

Scales of the slender rhizome elliptical, fixed at the centre, densely lacerato-fimbriate by thin at least hair-like ci~~l~~lia, when young reddish-brown with a black centre, terminating in a more sparcely fimbriate acuminate cusp that is soon broken off; scales very consistent and even old rhizomes are covered with bleaked, grayish scales with short whitish cilia and without cusp. Sterile leaves very variable in
(P. 346).
shape, sometimes nearly orbicular, 1 cm. wide each way, sometimes oblong 5-6 cm. long, by 1-1.5 cm. broad. Fertile leaves broadly linear, 8-15 cm. long, 6-8 mm. broad, obtuse, very gradually attenuated towards the short stipes. Coenosori when young more or less immersed in a submarginal groove with raised edge, at maturity superficial with the thick black receptacle at the same plane as the surface of the blade, still often with a sharp rim on the inner side. The mature sporangia form of a thick marginal band, 1-1.5 mm. broad, continuing round the tip of the blade, leaveing broader or narrower central portion of the blade uncovered, mixed with petiolate stellate hairs. Spores echinulate, i. e. the warts very sharp.

Surfaces of the young leaves with scattered minute sellate hairs with very short branches.

India, Malayan peninsula, Philippines, New Guinea, Siam, China: Hainan.

60. Hymenolepis Kaulfuss, Enum. Fil. 146, (1824).
Type: Acrostichum spicatum L. fil.
(Hymenolepis ophioglossoides Klf.).

Sporangia densely covering the under side of the much contracted, linear or spoon-shaped apex of simple fronds, often protected by the recurved edge when young. Rhizomes creeping, scaly; stipes articulated to the rhizomes; fronds lanceolate, apex fertile, suddenly contracted; with the mass of sori mixed with scales borne on its under side; veins anastomosing copiously; areolae with free included veinlets.

Sp. 5. confined to tropical Asia, on rocks or epiphytic on the trunk of trees. 1 recorded in S. China.

Hymenolepis henryi Hieron. MSS. C. Chr. in Dansk Bot. Arkiv. 6: 3. 67, (1929).

Rhizome short-creeping, the scales blackish, clathrate, with thick cell-walls, from a broad roundish base narrowed into a long, almost hair-like apex, short ciliate. Leaves densely tufted, subsessile (unwinged stalk 1-2 mm. long), thinly coriaceous, pale green, 15-20 cm. long, 2-4.5 cm. broad, shortly narrowed towards the spike or often suddenly contracted, truncate; surfaces naked, the veins hidden or faintly visible, no prominent main-veins. Spikes 5-15 cm. long, 1-4 mm. broad, without contriction at the base, the marginrecurved; sporangia borne on linear receptacles close to the midrib, rarely covering the whole underside but leaving the margins and as a rule also the midrib uncovered; the receptacles generally reach the base of the contracted portion. Paraphyses numerous with thick black walls.

Siam, N. India, China: Yunnan.

This species is doubtless most closely allied to H. annamensis C. Chr. which differs from it only by broad tapering contracted fertile apical portion with submarginal distinct coenosori.

61. Lemmaphyllum Presl. Epim. 157, (1849); C. Chr.
Dansk Bot. Arkiv 6: 3, 44, (1929).

Type: Lemmaphyllum spatulatum Presl.
& L. carnosum (Wall.) Presl.

Sproangia borne on a linear, continuous or sometimes interrupted receptacle parallel to the midrib and edge and confined to the outer half or two-thirds of the lamina, cover-

ed, when young, with clathrate umbrella shaped, fuscous and often iridescent scales that are deciduous
(P. 347).
and often quite absent in older leaves. Spores smooth or obscurely verrucose. Fronds simple, entire, conform and lanceolate or dimorphic and, the, the sterile on a generally much shorter orbicular or elliptic, short-stalked the fertile ones linear or narrowly linear-lanceolate; or spathulate on longer stalks the veins anastomosing and forming areolae with or without free included veinlets, no main-veins present. Rhizome creeping, on rocks or tree-truncks, the scales peltate, ovate-lanceolate, entire or shortly ciliate.

A typically Eastern Asiatic genus with 7 more or less related species, 3 recorded in China.

Key to species

I. Leaves dimorphic, the sterile ones rounded to elliptical, the fertile linear or spathulate (Eulemmaphyllum).
  A. Fertile leaves linear, the sterile ovate to elliptical, with short-cuneat base, 1-6.5 cm. long..1. L. carnosum
  B. Fertile leaves spathulate, the sterile usually orbicular, with rounded or subcordate base, 5-10 mm. long...............2. L. microphyllum
II. Leaves uniform, lanceolate (Pseudovittaria)...3. L. sinense.

1. Lemmaphyllum carnosum (Wall.) Presl. Epim. 153, (1849); C. Chr. Dansk Bot. Arkiv 6: 3, 49, (1929).

Nothochlaena carnosum Wall., 1828.
Drymoglosum carnosum J. Sm., In HK. Gen. Fil. t. 78 A. 1841; HKBK. 397; Matthew 359, 1911; Nakai l. c. 1826.
Taenitis carnosum Mett., 1856.
Cetosie carnosum O. Ktze., 1891.

A small fern with slender creeping rhizome Leaves dimorphic, the sterile ones short, ovate, or long, elliptic, rarely lanceolate, the smallest about 1 cm. long and wide, the largest 6.5 cm. long by 2.5 cm. wide; fertile ones usually much longer on stalks 4-6 cm. long, the blade 10 cm. 4 long by 2-3 mm. broad, linear or lanceolate; veins often visible in dried specimens; some minute substellate scales may be found scattered over the underside of theyoung leaves. Spores obscurely verrucose or nearly smooth.

Himalayas, India, Formosa, Japan, Siam, Tonkin, Hongkong, China: S. E. Tibet, Yunnan, Chihli, Kwantung, Hainan.

A very variable species and often compounded with its allies; from L. microphyllum it differs by larger leaves and especially by the long-stalked and long and narrow fertile ones; from L. microphyllum by lanceolate fertile leaves, which are broadest below the middle.

2. Lemmaphyllum microphyllum Presl. Epim. 273, (1849); C. Chr. Dansk. Bot. Arkiv. 6: 3. 47, pl. v. f. 1-2. (1929).

Drymoglossum microphyllum C. Chr., Ind. 246, 1906; Nakai l. c. 393, 1926.

Drymoglossum subcordatum Fee, 3 Memo 29, 5 Memo. 94. pl. 9 A f. I. 1850-52; Christ 131; NPfl. 303.

Drymoglossum carnosum var. subcordatum Baker, HKBK. 397, 1868.

Rhizomatic scales clathrate, from an ovate light-brown, lacerate-fimbriate, appressed basal part narrowed into a long dark-brown entire or subentire hair-like apex. Leaves dimorphic, the sterile ones of the typical form mostly orbicular with rounded or somewhat subcordate base, or ovate with short-cuneate, base, 0.5-10 mm. broad, the stalks 1-2 mm. wide; surfaces naked, or sometimes with few brown, ovate clathrate ciliate scales beneath; fertile ones spathulate, 2-3 mm. wide, rarely 5
(P. 348).
cm. long. Spores smooth.

Japan, Korea, Loochoo Islands, Formosa, China: Fukien, Kwangsi, Kwangtung, Hongkong.

A variable species, with some forms approaching Polypodium drymoglossoides Baker, from which it can be distinguished only with difficulty. Leaves sometimes are subdimophic, with the fertile ones, besides the typical spathulate forms, very much smilar to the sterile ones, though larger and ovate-oblong, and the sori often interrupted, sometimes even fully polypodioid.

Var. obovatum (Harr.) C. Chr. Dansk Bot. Arkiv 6: 3. 47 pl. V. f. 3. (1929).

Drymoglossum obovatum Christ, Journ. Bot. 19: 73. 1905; C. Chr. Ind. 246, 1906, Nakai l. c. 395 (excl. var.), 1926.

Stipes of sterile leaves 1-4 cm. long, the blade ovate or spathulate, long cuneate at base; fertile leaves generally much larger than the type.

Formosa, Loochow Islands, Japan, Annam, China: Hainan.

Var. lutchuense (Nakai) C. Chr. Dansk Bot. Arkiv 6: 3; 47 pl. V. f. 4. (1929).

Drymoglossum obovatum var. lutchuense Nakai, l. c. 396.

Sterile leaves ovate, cuneate or rounded at the base, 1.5-2 cm. broad, very thick and coriaceous with thickened margin, often distinctly nigro-punctate above, the stipes short; fertile leaves on longer stalks often linear and generally smaller than the preceeding variety.

Loochoo Islands, Tonkin, China: Hainan.

3. Lemmaphyllum sinense (Christ) C. Chr. Dansk Bot. Arkiv 6:
3. 51 pl. VI. f. I. (1929).

Neurodium sinense Christ, Bull. Boiss. 6. 880, 1898.
Paltonium sinense C. Chr., Ind. 477, 1906.

Rhizome creeping, the scales peltate, clathrate, ovate-acuminate, finely ciliate or subentire, fuscous brown, often darker in the centre. Leaves approximate, not dimorphous, lanceolate, us to 25 cm. long, 1.5 cm. broad below the middle, or much narrower, long attenuate towards the acuminate point, shorter towards the stipe, which is 2-4 cm. long; texture subcoriaceous or papyraceous, furnished beneath with some clathrate ovate scales, especially near the middle below. Veins hidden or faintly visible, forming 2-3 row of irregular areolae with free included veinlets. Coenosori continuous or interrupted on the upper half or two-thirds of the lamina, about 1 mm. from the margin, covered by clathrate scales, when young.

Burma, China: Yunnan, Hupeh.

In habit, the present species is a close ally to Polypodium lineare and this is particularly true of some forms, which have coenosori so interrupted throughout that several oblong or linear or rounded sori are perfectly polypodioid.

62. Drymotaenium Makino. Bot. Mag. Tokyo. 15: 102 (1901); Dansk Bot. Arkiv. 6: 3. 52-55 (1929).

Type: Taenitis Miyoshiana Makino.

Rhizomes short-creeping with dark clathrate peltate scales. Leaves uniform, narrowly linear or oblanceolate, vittaria-like, glabrous and
(P. 349).
naked, coriaceous. Veins deeply immersed, anastomosing and forming 1-2 rows of areoles with or without free veinlets; distinct main veins none. Coenosori linear, immersed, the sporangia in one species mixed with thin clathrate umbrella-shaped scales, in the other with filiform paraphyses.

A genus of only 2 species endemic in Eastern Asia.

Drymotanium miyoshianum Makino, Bot. Mag. Tokyo 15; 102, 1901;
Plan. et Pteridoph. Jap. I. pl. 12; C. Chr. Medd. Got. Bot. Tradg. 1: 98 (1924).

Taenitis miyoshiana Mak., Bot. Mag. Tokyo 12: 26 (1898).
Pleurogramme robusta Christ, Bull. Boiss, 6: 687 (1898).
Monogramme robusta C. Chr. Ind. 431 (1905).
Vittaria suberosa Christ, Bot. Gazette 51: 349 (not Bull. Soc. Bot. Fr. Mem. 1: 12).

Rhizome short, creeping, thick, black, densely clad in ovate-acute or lanceolate, clathrate, blackish and rather thick, dentate scales; fronds dense 20-35 cm. 3 mm. broad, linear, very thick coriaceous lustreous green, articulate to the short rhizome, leaving upon falling a prominent round scar, subsessile gradually narrowed towards both ends with broad flat raised costa beneath more than 1 mm. broad, marginly revolute, deeply grooved in the middle above, sori linear deeply sunk in groove between costa and margin above the middle and extending to a short distance to the apex of the leaves, dark brown, when young deeply immersed and upon maturity protruding above, mixed with a few thin clathrate umbrella-shaped paraphyses.

Japan, China: Yunnan, Szechwan, Hupeh, recently known from Tia-mo Shan, N. Chekiang.

63. Muropteris C. Chr. Dansk Bot. Arkiv 6: 3. 73. (1929).

Type: Drymoglossum cordatum Christ

Sporangia borne on a linear receptacle near the midrib, superficial; paraphyses none. Rhizome wide-creeping with fuscous clathrate scales. Leaves extremely dimorphic, quite glabrous and naked, the fertile ones on long slender stalks, narrowly linear; main veins indistinct, scarcely stronger than the others, which form oblique areolae, that nearly all, also the costal ones, include a free veinlet running towards the midrib.

A monotypic genus endemic in Tropical Asia.

This genus differs from Lemmaphyllum mainly by lacking peltate paraphyses and much stronger dimorphism and texture. In most technical characters it agrees with Pyc~~h~~noloma C. Chr. (cf. Dansk Bot. Arkiv. 6: 3. p. 75, 1929). but differs in venation, colour, texture, clathrate scales.

Myuropteris cordata (Christ) C. Chr. Dansk Bot. Arkiv 6: 3. 73 pl. IX. f. 1-2, X. f. 3. (1929).

Drymoglossum cordatum Christ, Not. Syst. 1: 375, 1911.
Campium dilatatum Copel., Philip. Journ. Sci. 37: 347, pl. 4. f. 2. 1928.

Scales of the wide-creeping rhizome clathrate from an ovate peltate base, rather suddenly narrowed into a long subulate apex, dark brown, very faintly teethed. Stipes of the sterile leaves slender, 3-10 cm. long, the blade ovate, 2.5-4 cm. long, 1-2.5 cm. broad, bluntly rounded or subacute at the apex, suddenly narrowed at the base, and shortly decurrent, the larger ones subcordate, dark-green and rather thin texture with thin entire margins, quite glabrous and naked. Midrib slender, raised on both sides, not reaching

the apex; mainveins none, veins distinct when held against the light, in larger leaves forming about 4 rows of oblong irregular areolae between the midrib and edge, several of which and also the costular ones include simple long free veinlets, that all run towards the midrib. Stipes of the fertile leaves thread-fine, up to 20 cm. long, the blade linear, 4-6 cm. long, 1-2 mm. broad, flat, the apex bluntly rounded. Coenosori running close to the midrib from the base of the lamina to about 5 mm. from the tip, superficial.

Annam, China: Hainan.

The species is distinguished by its long thread-fine stipes of the fertile leaves and the large broad oval sterile ones with truncate-cordate base and of a thin herbaceous texture.

64. Cyclophorus Desvaux, Berl. Mag. 5, 300, (1811).

Type: Polypodium adnascens Sw.

(P. 350).

Sori round, naked, sometimes hidden in the tomentum, being placed as close together as to often appear completely covering the lower surface or parts of the lower surface of the fertile fronds, inducium none, the sterile fronds usually more or less different in shape from the fertile ones. Fronds coriaceous, simple, entire, rarely divided, usually elongated, usually covered with few to many scattered or densely-arranged stellate hairs or scales at least on the lower surface; the veins anatomosing, not apparent.

Epiphytic, more rarely terrestial ferns, the rootstock creeping, scaly, the stipes not jointed to the rootstock. (Greek "circle" and "to bear," allusion to round sori).

Species about 36, throughout tropical countries, 29 are known in China.

This genus is characterized by epiphytic habit, creeping scaly rootstock, simple leaves, usually densely covered with stellate scales or hairs at least on the back of the frond, and dense dark brown sori mass usually all over the entire back of the fron.

Key to species.

1. Frond strongly dimorphous, the fertile ones much narrower and longer than the barren ones..............
..............................1. C. adnascens
1. Frond homomorphous or nearly so.
2. Frond lobed.
3. Frond linear-lanceolate, 2-5-fid at the apex.......
.........................2. C. xiphioides
3. Frond not linear-lanceolate.

4. Frond trilobed..........3. C. hastatus
4. Frond digitately lobed..4. C. polydactylon
2. Frond simple and entire.
3. Lateral veins more or less distinct at least on the lower side of the frond, which is usually distinctly stipitate.
4. Frond thin herbaceous-papery; 2-4 cm. broad, entirely glabrous on the upper surface..................................5. C. malacophyllus
4. Frond thick coriaceous.
5. Frond unequally cordate or truncate-rounded at base.
6. Stipes naked......6. C. sheareri
6. Stipes purveyed with persistent stellate hairs at least on the upper part...........................7. C. drakeanus
5. Frond gradually narrowed and cuneate towards base.
6. Underside of the rond purveyed with sparse stellate hair only, which fallen off completely at last.
7. Frond 3-7 cm. broad................................8. C. beddomeanus
7. Frond to 15 mm. broad...............................9. C. gralla
6. Underside of the frond purveyed with dense tomentum.
7. Stipe as long as the frond..........................10. C. bodinieri
7. Stipe usually shorter than frond.
8. Stipe more or less densely furfuraceous tomentum
9. Margin of frond revolute; stipe thick, stout, densely furfuraceous. ....11. C. subfurfuraceos
9. Margin plane or at most repand.
10. Stipe above 10 cm. long, densely cottony woolly; sori small, dispersed all over the entire underside.............12. C. flocculosus
10. Stipe much shorter, subfurfuraceous or
(P. 351). subglabrous; sori large,
confined to the upper part of
frond.......................13. C. calvatus
8. Stipes/h more or less stalleta haired or subglabrous.
9. Frond narrowly linear-lanceolate.
10. Margin reflexed in the broacest part; sori confined to the upper half of the frond........14. C. nudus
10. Margin plane; sori dispersed over

the entire under surfaceof the frond..............................15. C. stricticus.
9. Frond oblong-lanceolate or ligulate..........................16. C. lingua
3. Lateral veins indistinct.
4. Fronds distinctly stipitate.
5. Upper surface densely tomentose...17. C. acrocarpus
5. Upper surface calavate or more or less covered with deciduous stellate hairs.
6. Sori dispersed over the entire under surface.........................18. C. petiolosus
6. Sori confined to the upper half of the frond.
7. Frond above 30 cm. long, linear-lanceolate.................19. C. acrostichoides
7. Frond below 10 cm. long, ligulae or acute-ovate
8. Stipes as long as or longer than frond...............20. C. davidii
8. Stipes much shorter than frond......................21. C. martini
4. Frond linear, margin strongly revolute.
5. Fronds 2.5 cm. broad, margin not reflexed as fare as midrib............22. C. esquirolii
5. Fronds below 5 mm. broad, margin reflexed as far as midrib............23. C. taeniodes
4. Frond linear or otherwise, margin not revolute.
5. Frond woolly tomentose on the upper surface; sori in a single row on each side of the midrib........................24. C. linearifolius
5. Frond glabrous or at most deciduously hairy; sori in more than one row on each side of the midrib.
6. Fronds more or less tufted.
7. Frond linear, to 5 mm. broad..............................25. C. vittarioides
7. Frond lanceolate, over 1 cm. broad.....................26. C. porosus
6. Frond not tufted.
7. Frond with strongly involute margin; sori in 3-4rows.....27. C. assimilis
7. Margin of frond plane; sori in 4-6 rows...........28. C. spissus

1. Cyclophorus adnascens (Sw.) Desv. Bull. Mag. 5, 300, (1811).

Polypodium adnascens Sw., Syn. 25, 222 t. 2 f. 2, 1806; HBK 349 (pt.) 1860; Christ 98.
Niphobolus caudatus Klf., 1824; A.Fl. 325; Gies. Nipho. 156.

Niphobolus elongatus Bl., 1828.

Rhizome firm, slender, creeping with lanceolate, ciliate-fringed deciduous scales; stipes 0.6-2.5 cm. long, firm,

erect; fronds dimorphous;
(P. 352).
simple, entire, thick and coriaceous, more or less covered, especially on the under side, with minute stellate hairs or scales; sterile ones oblong, very obtuse, 1.8-3.7 cm. long on a stipes sometimes very short, rarely 1.2 cm. long; fertile fronds longer, linear, obtuse, 7.5-12.5 cm. long, covered from above the middle or from rather lower down to the apex with numerous closely-packed bright-colored small sori arranged in oblique rows, occupying the whole interval from the midrib to the margin and separated from each other by dense stellate hairs or scales; veins hidden.

N. India, Chusan, Formosa, Ceylon and Japan Hongkong, China: Hainan, Kwantung, Chekiang, Yunnan.

2. Cyclophorus xiphioides (Christ) C. Ch. Ind. 202, (1905); Matthew 355, (1911).

Niphobolus xiphioides Christ, Bull. Soc. Fr. 52 mem. 1. 25, (1905).

Rhizomes short, strong, densely radicose; leaves fasciculated; stipes clothed down to the base with rigid subulate ochraceous scales; leaves 25 cm. long, 1 cm. broad, shortly gradually decurrent towards the base along the stipes, acute but mostly irregularly 2-5-fid toward apex, costa elevated above, distinctly fuscous-green sparcely covered with grayish thin stellate hairs, distinctly punctate with numerous hydhatodes beneath, the upper surface covered with thin ochraceous tomentum of dimorphic stellate hairs: i. e. hairs very thin, spiral and strictly erect; sori glabose 3-5-seriat hidden in tomentum.

Kweichow.

3. Cyclophorus hastatus Thunb., C. Chr. Ind. 199, (1905); Matthew 354, (1911).

Acrostichum hastatum Thunb., Fl. Jap. 331, 1784.
Polyodium tricuspe Sw., 1801; HKBK. 350; Christ 97.
Niphobolus tricuspe J. Sm., 1875; N fl. 325; Gies. Nipho. 165.

Rhizomes stout, the scales gray lanceolate; stipes 15-20 cm. long, firm, erect. Fronds mostly hastate, 5-10 cm. each way, the central lobes lanceolate-deltoid, the lateral ones spreading, distinctly auricled at the base; texture coriaceous; upper surface naked, lower densely tawnymatted; sori minute in rows of 3-4 between the main veins, of 9-12 between the midrib and edge.

Japan, Corea, North China.

Quite peculiarly-looking little fern, very distinct for its hastate trilobed leaves.

4. Cyclophorus polydactylus (Hance) C. Chr. Ind. 200, (1905)
Matthew 354, (1911).

Polypodium polydactylon Hance, JoB. 269-270, (1883).
Niphobolus polydactylus Gies, Nipho. 167; N)fl. 325.

Rhizomes short radicose, ferruginose-tomentose, paleae lanceolate, entire, pale brown, acuminate, pil~~o~~lose toward apex, 4-6 mm. long; petiole brown-ebenaceous, 10-24 cm. long, 4-angular and sulcate on the lower part, plane upward; blades thick coriaceous, 10-12.5 cm. long, long excurvato-cuneate from the base, orbicular, pedatipartite, middle lobes simple the lateral 3-4 on the upper part, segments linear, acute orobtuse, 12-15 mm. broad, glabrous above, distinctly and minutely pitted below, ragged with whitish-fluvous stellate hairs which are 6-10-armed with the middle one yellowish-glandulose, costa impressed above, slightly elevated below, palmately branched, each passing
(P. 353).
into segment, venation cyrtophlebioid without maceration; sori arranged in 3-4 rows between costulas, each consisting 10 between costa and margin more or less immersed the pits.

Tatum, Kam-sim, Formosa, China: Kweichow, Chekiang, Fukien Kiangsi.

8. Cyclophorus malacophyllus (Christ) C. Chr. Ind., 199, (1905); Matthew 354, (1911).

Polypodium mollissimum Christ, Bull. Boiss. 6. 5, 18899, (non Fee 1866).

This species differs from the type of Cyclophorus flocculosum (Don) by texture being herbaceo-papyraceous, very thin, and flexible, (not coriaceous as in flocculosum), the upper surface absolutely glabrous, deep green, lower surface greyish-yellow covered with soft very thin silky closely adpressed narrow scales and more numerous sori i. e. there are between very oblique lateral veins which extend from costa to margin four rows of sori, each consisting of from 10-12 sori Plant 30 cm. long, frond 5 mm. broad; rhizome thick, short, covered with blackish-brown ovate scales.

Yunnan.

This is a very distinct species characterized by its thinest texture of the frond substance in the genus.

6. Cyclophorus sheareri (Baker) C. Chr. Ind. 201, (1905); Matthew 355 (1911).

Polypodium sheareri Baker, JoB. 201, (1875).
Nephobolus sheareri Diels, 1899, N)fl. 325.
Niphobolus inaequalis Christ, Bull. Soc. Fr. 52 Mem. I. 25. 1905.

Rhizomes wide-creeping, 4 mm. thick, the scales at the tip linear, acuminate, pale brown, 4 mm. long; stipes crowded, articulated to short phyllopodes from which fall away so as to leave the basac part persistent on the hizomes with a deep cup-shaped top, 10-15 cm. long, dull brown, naked; blade entire, lanceolate, 12.5-15 cm. long; with an equal broadly rounded or slightly cordate base, 3-3.7 cm. broad, apex bluntish or subacute; texture very coriaceous, the upper surface naked, the lower clothed in whitish tomentum; veins quite hidden; sori as in Cyclophorus hastatus (Thunb.) minute, in erect patent bands about 4 mm. broad, reaching from the midrib to the edge, about 6 between lateral veins, each consisting of 20-30 from the midrib to margin.

China: Shensi, Kansu, Kiukiang, Szechwan, Hupeh.

A very well-marked plant midway between cyclophorus lingua to Cyclophorus hastatus (Thunb.).

C. inaequalis is a form of the species with very elongated stipes, and one side of the base truncate, the other rounded-cuneate.

7. Cyclophorus drakeanus (Franch.) C. Chr. Ind. 198, (1906).
Matthew 354, (1911); Hand-Mzt. Symb. Sinic. VI. 46, (1929).

Polypodium drakeanus Franch., Nouv. Arch. Mus. II. 7. 165, 1883.
Niphobolus drakeanus Diels, 1900; Gies. Nipho; 117.

Rhizomes long-creeping, thick, clothed in dense fimbricate yellowish-brown linear-subulate paleae; peduncles articulate to the short, persistent phyllopodes to 25 cm. long or thrice as much shorter slender,
(P. 354.).
dark-coloured stramineous, densely clothed in stellate hairs which are persistent in some part. Laminaintense green above, clothed beneath with reddish downy stellate hairs, 10-18 cm. long, to 2 cm. broad, ovate-lanceolate, obtuse or shortly and obtusely acuminate, base rounded or very shorted lengthened, -or often in the young fronds truncate or else subcordate, or not unfrequently unequally subtruncate-cordate margin entire or subsinuate, thickened, the midrib broad, the lateral veins not very conspicuous, veinlets fine anastomosing, all immersed; sori small, between the secondary veins, almost covering the whole surface of the frond.

Kiangsi, Hupeh, Szechwan, Yunnan, Hunan, Hunan, Anhwei, Chekiang, Fukien.

Christensen considered this species as a mere form of C. spheareri differing only by its dense brown tomentum; Handel-Mazzetti on the other hand, considered it is distinct from C. sheareri by the presence of stellate hair not only on the under surface of the frond but also in the upperpart

of the stipes.

8. Cyclophorus beddomeanus (Gies) C. Chr. Ind. 198, (1905).

Niphobolus beddomeanus Gies., Nipho. 101, 1901, (non, Kze. 1834).
Polypodium costatum Wall. 1828.
Pyrosia chinensis Mirb., 1836.

Rhizome short-creeping, scaly at the extremity, the scales dark-brown, narrowed from a broad base into a long, acuminate, hair-point, the base not peltate. Stipes 9-18 cm. long, deciduously tomentose, not laterally compressed, the upper side flat, angled, not furrowed the lower side convexor angular. Fronds lanceolate, 30-90 cm. long, 5-7 cm. broad or broader, the apex acuminate, the lower part narrowed gradually to the base. Texture coriaceous, rather thin; costa and main veins distinct beneath; areolae hidden, in 8-14 rows on each side of the costa; upper surface covered with long-branched, interlaced stellate hairs, afterwards naked, not rarely purveyed with minute depressed dots, which are covered with deciduous, white, dot-like cretaceous scales; under surface tomentose like the upper, but the hairs intermixed with short-branched ones, the tomentum pale-brown or white when young, forming a close coating, Sori numerous, minute, immersed among the tomentum when young, occupying more or less the upper half of the frond, reaching to 1-3 mm. more from the margin, place in irregular continuous rows.

Malaya, N. India, China.

9. Cyclophrus gralla (Gies.) C. Chr. Ind. 199, (1906); Matthew 354, (1911).

Niphobolus gralla Geis., nipho. 128, (1901).

Rhizome short, creeping, base of the frond about 3-4 mm. apart, rhizomatic scales shield-like, quite variable in form and size, the basal ones much broader, triangular to long spike-like, the marginal and apical ones through their projecting marginal cells unregularly prickly haired, dark brown with lighter rim. Fronds linear-lanceolate, long acuminate, gradually narrowed downward into a quite long stipe, which is narrowly winged and as long as or longer than the blade, to 30 cm. long including the stipe, to 15 mm. broad, the size of the frond quite variable even from the same rhizome; in general the sterile appear smaller than the adjoining fertile fronds; the upper surface almost or completely naked, theunder surface as naked except for a few scattered stellate hairs provided with long, smaller stright
(P. 355).
arms; midrib prominent on both sides almost to the tip of the frond, the obliquely-ascending straight and prallel lateral veins less conspicuous on the upper side (in dried

specimens), veinlets inconspicuous forming rhombic areolae between the lateral veins generally with 3 free inclosed veinlets, each tipped with a water gland above; the water glands quite numerous. Sori placed dorsally on the veinlets or apical on their anastomosing veinlets, medium-sized, quite sparcely placed and no regularity can be detected; generally almost whole fertile frond is soriferous down to the tip of the stipe.

Yunnan, Kweichow.

10. Cyclophorus bodinieri Leveille, Fl. Kouy-tscheou 478, (1915).

Part of rhizome squamose and fulvescent. Frond 30-35 cm. long, 25 mm. broad, veins conspicuous on the undersurface of the sterile frond; sori small, dense; lamina and stipes are of equal length.

Kweichow.

11. Cyclophorus subfurfuraceus (Hooker) C. Chr. Ind. 201, (1905); Matthew 355, (1911).

Polypodium subfurfuraceus Hooker, Sp. 5. 52, (1863); HKBK. 351; Christ, 98.
Niphobolus subfurfuraceus Bedd., 1868, NFfl. 352; Gies. Nipho. 122.

Rhizomes short creeping, clothed with deciduous ferruginous fibrillose scales; stipes 10-15 cm. long, firm, erect. Fronds 45-60 cm. long, 10-12.5 cm. broad, the apex acuminate, the lower part narrowed gradually the edge entire; texture coriaceous; upper surface naked, lower with thin glaucous tomentum; main veins distinct to the edge, connected by arched areolae, with 1 or 2 irregular rows of 6-10 sori in each.

N. India, China: Yunnan, Kweichow, Szechwan.

12. Cyclophorus flocculosus (Don) C. Chr. Ind. 199, (105).

Polypodium flocculosus Don. Prod. Fl. Nepal. I. 1825; HKBK. 251.
Niphobolus flocculosus Spr., 1827; Gies. Nipho. 125.
Polypodium detergibile HK. 1863.
Nephobulus detergibile Bedd., 1866.

Rhizome short, the scales linear-subulate, pale-ferruginous; stipes 10-15 cm. long, firm, erect, cottony upwards. Fronds 15-45 cm. long, 1.8-3.7 cm. broad, narrowed very gradually to both ends; texture coriaceous; upper surface naked, lower densely matted with close glaucous or subferruginous tomentum; main veins distinct to the edge; sori small, bright-coloured, in straight rows of 4-6 each between them.

India, China: Yunnan.

13. Cyclophorus calavatus (Baker) C. Chr. Ind. 198, (1905);
Matthew 354, (1911).

Polypodium calvatum Baker, Jos. 304, (1879).
Niphobolus calvatus Diels, 1800.

Rhizomes wide-creeping, 3-4 mm. in diameter, with wrinkled brown acuminate rusty-brown membraneous scales at the base. Fronds lanceolate, entire, rigid in texture, 30 cm. long, 2.5 cm. broad, narrowed gradually from the middle to the base, bright green and naked on the upper surface, covered with a thin coa~~s~~t of deciduous drab tomentum beneath, main veins fine, erecto-patent, distinct to the edge at a
(P. 356).
distance from 0.6-2.5 cm. apart; sori round, superficial, 1 mm. in diameter, confined to the upper part of the frond, filling up the whole space between midrib and margin.

Allied to the Indian and Malayan Cyclophorus stigmosum (Sw.).
Hongkong, Kwantung, Szechwan, Kweichow, Hupeh.

14. Cyclophorus nudus (Gies) C. Chr. Ind. 200, (1905); Matthew
354, (1911).

Rhizome creeping, clothed with shield-like scales, scales lanceolate long-pointed, rounded below, fringed with fine hairs along the middle. Fronds almost alike or the sterile shorter and broader, blade lanceolate or almost linear, quite long and gradually acuminate toward apex narrowed downward into a short stipe, 1-4 cm. long to 30 cm. long and reflexed on the broadest part, which is nearer to the base, generally 8-11 mm. seldom to 15 or 17 mm. broad, when boiled in dilute alkaline solution it increases almost twice as broad; naked on the upperside, clothed on the lower side of the sterile leaves with scattered stellate hirs which are provided with short straight arms, the fertile at first provided on the under side with a thick coasting of the similar stellate hairs, which soon penetrated through by growing sporangia and finally fallen often almost completely; midrib distinct to the tip of the frond, the fine veinlets conspicuous only in the dried young specimens, anastomosing between the obliquely ascending lateral veins into 4-8 areolae with 2-4 inclosed free veinlets, or sometimes forked and anastomosing into smaller meshes. Sori sunk in pits, placed quite regularly in 4-6 slanting lines close on the veinlets between the midrib and margin, only the upper have of the blade soriferous.

N. India, China: Yunnan.

15. Cyclophorus sticticus (Kze.) C. Chr. Ind. 201, (1905);
Matthew 355, (1911).

Niphobolus sticticus Kze., 1851, Linn. 24. 257; Gies.
Nipho. 135.

Polypodium stictious Mett., 1857.
Polypodium fissum Baker, HKBK. 351 (pt.).

Caudex creeping, subulate-paleceous with ferruginous scales, stipes aggregated, short 7.5-12.5 cm. long, narrowly winged down to the base. Fronds carnosous-coriaceous, 15-30 cm. or more long, 1.2-3.7 cm. broad, lanceolate or linear-lanceolate or linear, often finely acuminated, the margin quite entire, from near the middle gradually attenuated downward to the caudex, at first wholly tomentose with dark ferruginous stellate hairs, at length glabrous on the upper side and depresso-punctate with the pits corresponding to the location of sori; veins quite sunked, pinnate, not prominent, veinlets transversely parallel and forming with the veins parallelogramoid areolae, with two sometimes only one included free clavate veinlet in each areola; sori copiously, at first quite hidden among the tomentum, appearing in the form of small tubercles, at length a circular opening appears, the sori scarcely rise above the surface of the tomentum, arranged in series.

Ceylon, Luzon, India, China: Hainan, Kweichow, Yunnan, Szechwan, Kwantung.

Inhabiting at fairly high attitude.

16. Cyclophorus lingua (Thunb.) Desv. Prod. 224 (1827); Matthew 354 (1911).

(P. 357).
Acrostichum lingua Thunb., Fl. Jap. 330, t. 33. 1784.
Polypodium lingua Sw., 1806; HKBK. 350 (pt.).
Niphobolus lingua Spr., 1827; NFl. 325; Gies. Nipho. 156.

Rhizome wide-creeping, clothed with spreading lanceolate ferruginous scales; stipes 7.5-15 cm. long, firm, erect, Fronds uniform, oblong or oblong-lanceolate, 10-20 cm. long, 2.5-10 cm. broad, the apex often cuspidate, the base narrowed or rather rounded, the edge entire; the fertile frond fully as broad as the sterile and usually longer; texture coriaceous; upper surface naked, lower matted with close compact cottony subferruginous down; main veins distinct to the edge; sori rather large and prominent, in close rows of 4-6 each between them.

In India, Formosa, Korea, Japan, Hongkong, China: Hainan, Kwantung, Anhwei, Kiukiang, Kiangsu, Chekiang, Fukien, Manchuria, Chihli, Shantung, Hupeh, Szechwan, Yunnan.

17. Cyclophorus acrocarpus (Christ et Gies) C. Chr. Ind. 127, (1905); Matthew 354, (1911).

Niphobolus acrocarpus Christ et Gies, Bull. Geogr. Bot. Man. 221, (1902).

17. Rootstock short-creeping, nodose, covered at apex by suberect penicillate scales, the scales peltately affixed to the rhizome lanceolate-elongate, with ciliate margin and tortuous hair-pointed apex. Leaves oblong, spathulato-dilated towards apex, shortly acuminate, slightly attenuate toward base, shortly and narrowly decurrent along the stipes, 10 cm. long, 8-10 mm. broad, broadest ¼ below the apex, remarkably dense tomentose on the upper side, tomentum fine, araneous, composed of pale stellate hairs, arms fine, erect, ragged, dense, cinnamomon tomentose beneath, composed of dimorphic stellate hairs; the superior pilia brachiate, erect, brown, the inferior ones radiate, long lanoso-tortuous, decoloured; costa distinct to the sori mass below and conspicuous to the apex above; veins numerous, hidden, obliquely ascending, anastomosing regularly, each areola including more than three free veinlets, which are seriferous and with apices extending into hydathodes beneath; sori large, subtomentose, confluent, occupying the upper ½-1/3 part of the frond extending to the apex.

Kweichow, Yunnan.

18. Cyclophorus petiolosus (Christ) C. Chr. Ind. 200, (1905); Matthew 354, (1911).

Polypodium petiolosus Christ, Nu. Giorn. Bot. Ital. n. s. 4, 96. t. 1 f. 2. (1897).
Niphobolus petiolosus Diels, 1900; Gies. Nipho. 146, (1901).

Rhizome much branched, creeping, 1.2 mm. across, clothed in large, ovate reddish scales; dry specimens coriaceous; frond involute rarely plano, subdimorphic; sterile ones shorter, the fertile longer, the sterile stipitate, stipe slender but firm, 4 cm. long (sometimes less than 1 cm. sometime to 10 cm. long); frond 2-6 cm. long, ½-2 cm. broad, ovate, obtuse, not decurrent towards the stipe, margin very entire, the upper surface of the blade grayish-green, at first scurfy with stellate hairs, soon becomes calvata, distinctly punctated by sori, the under surface clothed in whitish-red appressed stellate tomentum, scales somewhat stellate, brown, along the costa, and sparsely over blade marked with a central disc; fertile fronds long stipitate, blade ovate-oblong, and even longer than the sterile clavato-involute, the under side from the tip of the stipe upward to the apex of the blade all covered with red-brown sori; sori minute, confert, or contiguous.

Korea, China: Shensi, Yunnan, Chekiang, Honan, Manchuria, Chihli, Szechwan.

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Allied to Cyclophorus lingua, which is however, larger in all parts and with monomorphic plane fronds.

19. Cyclophorus acrostichoides (Forst.) Presl. Epim. 130, (1849).

Polypodium acrostichoides Frost., Prod. 81, 1786; HKBK 350.

Cyclophrus glaber Desv., 1811.

Cyclophorus scolopendrium Desv., 1827.

Niphobolus puberubes Bl., 1828.

Niphobolus acrostichoides Mich., 1834; Gies. Nipho. 213; NPfl. 325.

Rhizomes woody, wide-creeping, clothed with roundish adpressed scales, black in the center; stipes 2.5-7.5 cm. long, firm, erect. Fronds 30-60 cm. long, 1.2-2.5 cm. broad, ligulate, narrowed very gradually below; texture very coriaceous; upper surface naked, lower clothed with thin dirty white tomentum; sori bright-coloured, not immersed, small, close, covering the whole of the upperpart of the frond.

Ceylon, Malaccas, Philippines, Polynesia, Queensland and South China: Hainan.

Differing from Cyclophorous adnascens by larger size, more rigid texture and sori not buried in the tomentum.

20. Cyclophorus davidii (Baker) Hand.-Mzt. Symb. Sinic. vi. 46, (1929).

Polypodium davidii Baker, Ann. Bot. 5. 472, 1891; New Ferns. 18, (non French. 1887).

Niphobolus pekinensis Gies., Nipho. 152.

Rhizomes slender, wide-creeping; paleae small, brown, lanceolate; fronds coriaceous homomorphous, linear or lanceolate, 5-7.5 cm. long, 6-15 cm. broad, breadest in the middle, narrowed into a distinct stipe, thinly tomentose beneath; stipes terete, stout, of the same color mainly confined to the upper half of the frond, continuous from the midrib to the margin.

Intermediate between Cyclophorus adnascens and Cyclophorus lingua.

Ichang, Honan, Kiangsu, Chihli, Peking, Yunnan, Shensi, Kweichow, Szechwan.

21. Cyclophorus margini (Christ) C. Chr. Ind. 198, (1905); Matthew 354, (1911); Hand.-Mzt. Symb. Sinic. VI. 45, (1929).

Niphobolus martini Christ, Bull. Soc. Fr. 52 mem. 1. 24, (1905).

Rhizomes long-creeping, thick as goose's quill, clothed with adpressed rufous-brown subulate diaphanous scales 3-5 mm. long; stipes solitary, base densely squamarous, 2½ cm. long, slender, scarcely 1 mm. thick, sulcate. Lamina sterile 4-5 cm. long, 2½ cm. broad, obtusely ovate, not attenuate along the stipes; the lateral veins 8-10, scarcely conspicuous, ½ cm. apart, texture hard, coriaceous, ochrolouscent, the uppersurface conspicuously punctate with hydathodes. glabrous, but suberosous opaque, the under surface densely covered with very dense rubiginose, very shortly adpressed uniform shining stellate-hairs, fertile lamina acute-ovate, 6½ cm. long, 4cm. broad, sori confined to the upper part, rarely over the entire frond, conspicuously brown, rather remote, not confluent, 1 mm. broad.

Hupeh, Yunnan, Kweichow, Szechwan, Kiangsi, Fukien.

A small form of C. lingua, differs by not prominent lateral veins and much smaller and broader rhizomatic scales of harder texture.

(P. 359).
22. Cyclophorus esquirolii Leveille, Fl. Ko~~yk~~uy-tscheou 378, (1915).

Rhizomatic scales setaceous and fulvous. Frond 2.5 cm. wide, with revolute margin, texture rigid, coriaceous, under surface covered with stellate hairs, petiole subsessile; midrib saffron or golden yellow; sori sparce, lax.

Kweichow.

23. Cyclophorus taeniodes (Baker) C. Christ, Ind, 201, (1905); Matthew, 355, (1911).

Polypodium angustessimum Baker, Ann. Bot. 5. 472, 1891 New Ferns (non Fee 1869).
Niphobolus taeniodes Gies, 1899, Nipho. 132; Pfl. 326.
Niphobolus cavalerianus Christ, Bull. Geogr. Bot. Mans. 107. 1904.
Cyclophorus cavalerianus C. Chr., Ind. 198. 1906).

Rootstock slender, wide-creeping, clothed with lanceolate reflexed hair-pointed pale brown adpressed paleae. Stipe none or very short. Fronds linear, blunt or acute, rigid, 2.5-10 cm. long, 2-3 mm. broad, with broad revolute edges which close over the back entirely, bright green and naked above or sparcely covered by rusty stellate hairs, densely coated below with thick whitish woolly tomentum, veins quite hidden. Sori small, confluent, covering the whole surface of the upper part of the frond.

China: Hunan, Szechwan, Hupeh, Yunnan, Shensi, Kweichow, Hupeh, Chekiang, Anhwei - Hwang Shan.

Habit of C. linearifolius C. Chr.

On maturity the revolute edge split alongthwise, exposing dense brown sori.

24. Cyclophorus linearifolius (Hk.) C. Chr. Ind. 199, (1906);
    Matthew 354, (1911).

Niphobolus linearifolius Hk., 2 Cent. t. 58, 1861; NPfl. 326; Gies. Nipho. 171.
Polypodium linearifolium Hk., HKBK. 356.

Rhizomes wide-creeping, densely clothed with second fibrillose ferruginous scales; fronds sessile, 7.5-10 cm. long, 2.5-3.7 cm. broad, blunt, ligulate, entire; texture subcoriaceous; upper surface slightly, lower densely coated with loose woolly tomentum; areolae in 2 irregular rows without main veins; sori in a single row on each side of the midrib.

Tsus-sima, Formosa, Loochoo, Japan, Hongkong, C. Korea, China: Kwantung, Hainan, Szechwan, Anhwei, Hunan, Manchuria.

25. Cyclophorus vittarioides Christ, Bull. Geogr. Bot. Man.
    (1909) Mem. 1. 175; Matthew 355, (1911).

Rhizomes much branched, glomerately tufted, as thick as raven's quill covered with subulate scarious-dark-brown scales 3 mm. long; leaves close, numerous (about 14 together, ligulato-linear, 25 cm. long, 5 mm. broad, acuminate, decurrent towards base on both sides; costa conspicuously prominent; leaves glabrous, hydathoid on upper side; sori 5-seriate, close, not confluent, distinctly cinnamomum brown, 1-1½ mm. broad, rounded, the lower surface finely gray tomentose with stellate hairs, color yellow-green; texture subcoso-coriaceous.

Kweichow.

26. Cyclophorus porosus (Wall.) Presl. Epim 150, (1849);
    Matthew 355,
(P. 360).
Polypodium porosum Wall., 1828.
Polypodium fissum Baker, Ft. Buett. HKBK. 351, non Bl. 1828.
Niphobolus mairii Gies., 1901, Nipho. 107.

Rhizomes stout, short creeping, the scales dense, spreading, lanceolate, ferruginous; stipes none or very short; fronds 15-30 cm. long, 1.2-3.5 cm. broad, narrowed very gradually to both ends, with entire edge; texture subcoriaceous; upper surface naked, lower densely coated with soft wolly ferruginous tomentum; veins hidden; sori closely scattered, immersed amongst tomentum.

N. India, Formosa, China: Szechwan Hupeh, Chekiang, Yunnan.

27. Cyclophorus assimilis (Baker) C. Chr. Ind. 198, (1905); Matthew 334, (1911).

Polypodium assimile Baker, Jour. 201, 1875.
Niphobolus assimilis Diels, 1900.

Rhizomes wide-creeping, 2 mm. thick, scales lanceolate, secund light brown, 2 mm. long; fronds sessile, linear-ligulate, 5-7.5 cm. long, 4-5 mm. broad (in the middle, blunt or subacute, narrowed very gradually to the base; texture very coriaceous more often strongly involuted; upper side at first finely pilose, finally glabrous; tomentum on the lower surface thick, rather ferruginous; veins quite hidden; sori on the upper third or rarely the upper half of the frond in a continuous mass, 3-4 rows between the edge and midrib imbedded in loose bristly hairs; barren fronds of the same shape as the fertile but rather shorter and blunter.

Kiukiang, Chihli Kansu, Szechwan, Anhwei, Chikiang-Hongchow.

Intermediate between C. fissum and C. adnascens var. varium but the tomentum not so thick or loose as in the former.

var. mollifrond Handl.-Mzt. in Sitzgsanz. Ak. Wien. 101, (1922).

Fronds distinctly Amorphous, the fertile ones 4 mm. broad, the sterile one and the sterile part of the fertile 6-9 mm. broad, lanceolate, obtusish, slender, sparcely stellate hairy, the arms long, very fine, erect, pale-colored, with the central one brown and stiff.

Hunan.

28. Cyclophorus spissus (Bory) Desv. Berl. Mag. 5. 301, (1911).

Polypodium spissus Bory, Willd. Sp. 5. 146, (1910).
Niphobolus spissus Gies., 1901, Nipho. 204.
Polypodium vittarioides Wall., 1828.
Niphobolus spissus Presl., 1835, N. fl. 325.

Caudex much-branched, filiform, creeping, the old ones naked, the young densely clad in narrow-lanceolate paleae. Sterile and fertile fronds not essentially unlike, at most the sterile slightly shorter, the sterile 5 cm. long, coriaceous, thick, oblong-lanceolate, entire, glabrous above, scurfy with short stellate hairs below; the fertile fronds 7.5 cm. long, lanceolate, narrower than the sterile, thick coriaceous, the under surface always covered with sterillate hairs; sori sunk, piercing through the tomentum, subserial,

irregularly confert, typically in 3 rows between the lateral veins and each consisting 4-6 sori between midrib and margin, their location is distinctly punctated on the upper side, sori confined on the upper part and extending to the apex of the frond.

South Africa, Ceylon, N. India, China: Yunnan, Kweichow.

(F. Sol).

85. Drynaria (Bory.) J. Smith, Journ. Bot. 4. 60, (1841).

Type: Polypodium quercifolium L.

Sori numerous, oblique, dorsal, borne in regular rows on the veins, sometimes irregular and confluent. Fronds rigid, distinctly heteromorphic, the sterile ones sessile, broad-cordate, sinuose or laciniate; the fertile ones stipitate or sessile, pinnatifid or pinnate, rarely simple, the segments articulated to the rachis; when sessile the base is similar to the sterile ones. Veins external, elevated, compoundly anastomosing in quadrate or hexagonal areolae, primary veins costaeform or obsolete. Rhizomes always creeping, short or long, usually thick and fleshy, epigaeous. (Greek "oak-leaf", from the resemblence of the sterile humus-gathering basal leaves to the leaves of the oak.).

Coarse, usually epiphitic ferns, with very stout, densely woolly paleaceous, creeping rootstock, In habit allied to Polypodium, from which it can easily be distinguished by dimorphic fronds; the sterile humus-gathering basal vegetative ones, which are first green, soon become dry brown, sessile, much shortened, thickly coriaceous, concave, quereciform, strongly veined, shining, variously lobed or erosed, and the ordinary fertile ones, many times as large, green, erect, deeply but only simply pinnatifid.

About 15 species in tropical Asia, particularly abundant in eastern Himalaya and the warm temperate regions of China, wherefrom 10 are definitely recorded.

Key to species

1. Sori regularly placed in one or more rows.

  2. Sori one-rowed on each side of the midrib of segments.

    3. Fertile frond softly dense hairy on both surface and ciliate along the margin; sori close to the midrib.....................1. D. mollis

    3. Fertile frond glabrous, sori more or less remote from the midrib.

4. Fertile and sterile fronds almost alike texture
membranaceous, segments finely serrate............
..........................2. D. sinica
4. Fronds strongly dimorphic, texture much thicker,
serrations otherwise.
5. Fertile segments triangular-lanceolate, 2.5 cm.
broad, lower ones much shortened, margin
undulate................3. D. delavayi
5. Fertile segments lanceolate, much narrower,
lower ones not shortened, margin only
obscuredly serrated....4. D. propinqua
2. Sori one to two rows between the lateral veins of
segments.
3. Sori large, one-rowed between lateral veins............
.............................5. D. fortunei
3. Sori smaller, two-rowed between lateral veins..........
.............................6. D. quercifolia
1. Sori irregularly disposed
2. Sterile frond broad-ovate, brown, hard, coriaceous,
cut into blunt lobes.............7. D. speciosa
2. Sterile frond cymbiform, light straw-coloured,
flexibly papery, entire.........8. D. bonii
(P. 362).

1. Drynaria mollis Bedd. Ferns Br. Ind. t. 216, (1867); Hkfl. 330;
Matthew 359, (1911).

Polypodium nivale Watt., 1868; HkBk. 367; Christ 121.

Rhizomes stout, the scales dense, linear, bright-ferruginous; fronds dimorphous, the barren ones 10-15 cm. long, 4 mm. broad, cut down three-quarters of the way to therachis into spreading blunt lobes, the fertile ones 3060 cm. long, 15-20 cm. broad, with a distinct stipes, the blunt entiøre lobes 5-7.5 cm. long, 1.2 cm. broad, reaching down nearly or quite to the rachis; texture of the fertile fronds papyraceous; main veins not more than 3 mm. apart; areolae fine, with copious free veinlets, all directed towards the edge, the close sori terminal on free veinlets in the costal series.

Himalayas, China: Yunnan.

Var. yunnanensis Christ, Bull. Boiss. VII. 3, (1899).

Larger than thetype. Pinnae more broadly crenulate, lateral veins rather distinct to the margin, areolae more numerous and less regular, with fewer included veinlets.

Yunnan.

2. Drynaria sinica Diels, Engl. Jahrb. 29, 208, (1900): Matthew 359, (1911).

Polypodium baronii Christ, Hu, Giorn. Bot. Ital. n. s. 100 t. 2, 1887; Christ 120.

Drynaria reducta Christ, in C. Chr. Ind. 249. 1906.
Drynaria baronii Diels, NPfl. 330 f. 171. C. 1898.

Rhizome thick, 1.5 cm. across (incl. hairs) creeping, clothed with very dense, deep rust-gray, paleae; lamina somewhat dimorphous, membraneous, dark green glabrous, 40-50 cm. long, 12-15 cm. broad with shortly elongate stipes, oblanceolate-oblong, pinnately cut to the costa; pinnae gradually diminiate towards the base of the lamina, finally reduced to very short spreading lobes acuminate, margin serrulate, 6-8 cm. long, 1-1.5 cm. broad; veins slender, conspicuous, the lateral veins regularly surrounding the areolae, venules free, numerous. Sori regular, in a single row midway between costa and margin.

Characterized by thin dark-green fronds and fine serration of the pinnae.

Szechwan: W. Tao-Kuan.
Rhizomes used for medicine.

It is probable that this species is an extreme variety of D. propinqua connected with it by D. delavayi

3. Drynaria delavayi Christ, Bull. Soc. Fr. 52. Mem. I. 22. (1905); Matthew 359, (1911).

Rhizomes strong, creeping, thick as a man's finger, clothed with yellow-fuscous subulate scales; soriferous leaves, remote, stipes 15 cm. long, often shorter, sulcate, castaneous, entire plants glabrous; lamina 30 cm. long, 18 cm. broad, ovate-acute, attenuate towards base (i. e. the lower pinnae abbreviate, obtuse, 4 cm. or less long, decurrent) pinnatifid down to the rachis. Pinnae 11 on each side of the rach, the middle ones 10-13 cm. long, broadly adnate /b base, 2 cm. broad, gradually attenuate towards the acute apex, triangular lanceolate with abruptly acute blunt apes and acute or rounded sinuses, margin broadly irregularly crenate and denticulate; lateral veins distinct almost to the margin, veinlets prominent, regularly reticulated and with many free clavate included veinlets; texture subcoriaceous, subdiaphanous, surfaces opaque, color flavescent. Sori large, 2 mm. broad, about 25 on each side of the costae, reddish brown, uniseriate, adpressed to the
(P. 363).
costa near or at the base of more or less arched lateral veins. The sterile leaves erect, not cymbiform, close, sessile, broad ovate, 15 cm. long, 8 cm. broad, almost shining, cartilaginous, at first castaneous then turning gray, cut to a broad wing; lobes 15 on each side, lanceolate obtuse, se/parate by very acute angles; leaves abbreviate sometimes soriferous and turning green in apices.

Kweichow, Szechwan.

Allied to D. mollis Bedd., differs by almost glabrous, rigid lucid coriaceous texture, conspicuous lateral veins and margin of the segments not ciliate.

4. Drynaria propinqua (Wall.) J. Sm. JoB. 4. 61, (1841); NPfl. 330; Matthew 359, (1911).

Polypodium propinquem Wall., 1828; Mett. Pl. 120, n. 239 t. 3. f. 30, 1857; HKbK. 367; Christ 119.
Pleopltis parishii Bedd., 1866.
Drynaria parishii Bedd., 1875.

Rhizomes woody, wide-creeping, the scales linear, bright ferruginous; frond dimorphic, the barren ones 10-23 cm. long, 7.5-10 cm. broad cut half of three-quarters of the way down into bluntish or acute lobes, the fertile ones 45-50 cm. long, often 30 cm. broad, with a distinct stem, the lobes 10-15 cm. long, 1.2-1.8 cm. broad, reaching down nearly or quite to the rachis; texture subcoriaceous; areolae copious, the free veinlets few and variously directed; sori in row near the midrib, placed at the point of union of several veinlets.

West African Islands, N. India, Java, China: Kwantung, Szechwan Omei Shan.

Var. mesosoria Christ, Bull. Geogr. Bot. Man 108, (1906).

Differs from the type in veinlets being not prominent; sori not close to the costa, but almost medial between costa and margin; sometimes the cymbiform leaves deeply lobated, texture verido-herbaceous and soriferous; i. c. a trasition from the sterile leaves to ordinary fertile ones.

Szechwan.

5. Drynaria fortunei (Kze.) J. Sm. Bot. Voy. Herald. 425, (1857); NPfl. 330; Matthew 359, (1911).

Polypodium fortunei Kze., Mett, Pl. 121. n. 241, 1857; HKbK. 367; Christ 119.

Rhizomes woody, the scales linear, bright ferruginous; fronds dimorphous, the barren ones broadly ovate 5-7.5 cm. long, 2.5-3.7 cm. broad, lobed, the upper lobes deltoid-acute; the fertile ones 30-40 cm. long, 10-15 cm. broad, cut down nearly or quite to the rachis into lanceolate or oblong acute or bluntish entire 6-11 pairs erecto-patent close lobes 5-10 cm. long, 1.8 cm. broad, margin entire or very obscurely crenulato-serrate sinuses narrowly acute; texture subcoriaceous; main veins distinct, 2-4 mm. apart, connected by prominent transverse veinlets, with a few faint ones in the intervals; sori in single rows of 3-4 (mostly 4) midway between the lateral veins.

Hongkong, China: Hupeh, Kuikiang, Hunan, Chekiang, Szechwan, Kwantung, Fukien, Yunnan.

A very common epiphytic fern on the truncks of trees of exposed limestone cliffs and varies considerably in size and manner of cutting.
(P. 364).

Drynaria quercifolia (L.) J. Sm. JoB. 3. 398, (1841); NPfl. 329. Matthew 359 (1911).

Polypodium quercifolium L., 1753, HKBK. 367; Christ 118.
Polypodium schkuhrii Bory, 1825.

Rhizomes very stout, somewhat fleshy, the scales dense, brightbrown, 6-12 mm. long, lanceolate-acuminate, the barren ones (or humusgathering fronds) brown and shining when mature, sessile, 7.5-30 cm. long, 5- cm. broad, rigid, ovate, somewhat imbricate, bluntly lobed often halfway down; the fertile ones long stalked, stipes 35-75 cm. long, narrowly winged, the fronds 60-90 cm. long, 30 cm. or more broad, cut down nearly to the rachis into entire erecto-patent lobes, 15-23 cm. long, 1.2-3.7 cm. broad; texture rigid coriaceous, both sides naked; main veins distinct to the edge with 4-6 quadriangular areolae between midrib and edge, enclosing each two large sori on copious lesser areolae.

Australia, Polynesia, China: Kwantung,
Occasionally on trunks of trees, old walls, etc.

7. Drynaria sparsisora (Desv.) Moore, Ind. 348, (1862); Matthew 359, (1911).

Polypodium sparsisora Desv., Berl. Mag. 5. 315 (1811); Christ 118.
Polypodium linnei Bory., Ann. Sci. Nat. 5. 464 t. 12, 1825; Mett. Pol. n. 2436; HKBK. 368; Christ 118.
Drynaria linnei Bedd., 1869; NPfl. 329.

Rhizomes stout, the scales 2-4 mm. long, broadly ovate, obtuse with a short deciduous acumen from a peltate base; fronds dimorphous, the barren ones sessile, brown, rigid, bluntly lobed; the fertile ones long-stalked, 2/3-1 m. long, 15-30 cm. broad, cut down nearly to the rachis into entire erecto-patent lanceolate lobes; texture rigid; both sides naked; main veins distinct to the edge, with copious irregular areolae between them, with copious small scattered sori.

Tropical Australia, Ceylon, Malesia, Fiji, N. India, China: Kweichow, Yunnan,

New to China.

8. Drynaria bonii Christ, Not. System 1. 186, (1910).

Rhizomes ~~//~~ creeping, almost as thick as a man's finger, clothed with ovate- (4 mm. long and broad,) op~~n~~aque, abundant blackish setae; vegetative leaves articulate, dorsiventral remote or close, partly pinnatifid; stipes to 25 cm. long, teret, lucido-brown, rather broadly winged down to the base; lamina 45 cm. long, 20 cm. or more broad, long acuminate, scarcely narrowed towards base, broadly ovate, profoundly pinnatifid towards rachis to a more or less broad wing, lobes 3-5 on each side, remote, separate by broad round sinuses to 6 cm. broad, erecto-patent, ovato-lanceolate, acuminate, 12 cm. long, 3-4 cm. broad, subentire, undulate, repand, the apex of the frond bi-lobed, the terminal one similar or larger than the lateral ones; veins prominent, 7-10 mm. distant, extending almost to the margin, erecto-patent, rather prominent, veinlets distinct anastomosing in 6 rows of meshes with several free included veinlets; sori very irregularly placed on veinlets, numerous, obscurely brown, rather remote, scarcely 1 mm. broad, almost rounded; texture coriaceous, both surfaces naked shining brownish-green. The vegetative leaves simple, to 28 cm. long, broadly lanceolate liguuform, shortly decurrent along a narrow wing along petiole, subacute, 55 mm. broad, soriferous towards apex; sterile leaves
(P. 365).
cymbiform, densely imbricate, adpressed to the rhizomes, rounded-reniform, 7 cm. (rarely more) each way, almost entire, repand, rarely unulato-sublobulate, papyraceo-scarious, flexilate, subnitidous, greyish-furscous, rarely light brown; costa prominent, strong, veins almost flabellato-pinnate, scarcely hardened.

Tonkin, China: Kwe~~n~~ichow, Kwangsi, S. Kwantung.

In habit, resembling D. fortune; J. Sm. but differs by fewer broader acuminate segments separated by very broad rounded sinuses, very irregular smaller obscurely brown sori, and, particularly, its cymbiform unlobed flexilate humus-gathering fronds.

66. Polypodium Linnaeus, (Gen. Pl. 784) Spec. Plant. 2. 1082, (1753).

Type: Polypodium vulgare L.

Sori mostly round, or oblong or linear, superficial, sometimes sunk in cavities, usually very numerous, dorsal or sometimes terminal on the veins scattered or in regular rows, not strictly marginal, but on or adjoining or between veins or veinlets; inducium none. Frond simple and entire, pinnatifid, or once, twice or thrice pinnate, glabrous, scaly or hairy; veins either free and extending directly to the margin or variously anastomosing. Rootstocks mostly creeping or erect; the stipes scattered, articulated to the rootstock (that is, leaving a distinct scar behind

when broken off). (Greek "man" and "feet," alluding to the branching rhizome).

A large, herbaceous, polymorphous genus with over 940 species of varies habit in both hemispheres, mostly tropical, few in temperate and cold regions, most of them are terrestrial, but some are epiphytic on trees in humid tropics. About 130 recorded in China.

Key to species.

I. Veins free; sori dorsal on veins (not terminal on veins) superficial or immersed in dorsal or submarginal pits (= Eupolypodium).

2. Fronds simple, the margin entire, crenate, repand or toothed (subsect. integrifoliae).

3. Fronds to 6 mm. broad.

4. Fronds to 7.5 cm. long, membranceous, covered in reddish-brown hairs....1. P. hirtellum

4. Fronds above 7.5 (-13) cm. long, coriaceous, slightly furfuraceous on the midrib...22. P. congenerum.

3. Fronds 2-5 cm. broad.

4. Fronds 2 cm. broad, to 5 cm. long...3. P. dorsipilum

4. Fronds above 3.5 cm. broad, above 5 cm. long...................................4. P. mediale

2. Fronds more or less pinnate; pinnae more or less confluent or distinct at base; pinnae entire or slightly serrated.

3. Pinnae adnate or decurrent by a wing, lower pinnae sometimes distinct; fronds lanceolate or oblong-lanceolate.

4. Fronds below 4 cm. broad; stipes below 2 cm. long or sessile.

5. Frond to 8 mm. broad; veins simple or forked in each pinna; sori one to each pinna, near the base...............5. P. sikkimense

5. Fronds above 1 cm. broad; veins pinnae in each pinna; sori in a row on each side of the costule.

(P. 366). 6. Fronds glabrous; sori slightly immersed.............................6. P. repandulum

6. Fronds hairy; sori deeply immersed or superficial.

7. Fronds to 2.5 cm. broad, pinnae ligulate-oblong, entire; sori deeply immersed.....................7. P. cryptosorum

7. Fronds 2.5-3.7 cm. broad; pinnae deltoid-lanceolate, serrate; sori superficial.....................8. P. subflacatum

4. Fronds above 5 cm. broad; stipes much longer.

5. Fronds 5-8.2 cm. broad; pinnae 4 mm. broad; sori small............9. P. simulans

5. Fronds 7.5-15 cm. broad, pinnae 6-12 cm. broad; sori large............10. P. vulgare

3. Pinnae petiolate; fronds broadly deltoid...11. P. stenopteris
2. Fronds bipinnatifid, i. e. the pinnae deeply lobed...12. P. convolutum
2. Fronds 3-pinnate or quadripinnatifid, segments linear-ligulate..............................13. P. dareaeformioides
1. Veins anastomosing more less copiously.
2. Veins forming 1 or rarely more rose of regular areolae, each with a free or rarely forked, included excurrent veinlet. Sori terminal on the included veinlets, commonly in the costal areolae only (§ Goniophlebium).
3. Fronds pinnatifid, i. e. all pinnae connected by a more or less broad wing along both sides of rachis (Subsect. Synammia).
4. Fronds glabrous.
5. Fronds below 8 cm. long, deltoid; segments 1-2 or raarely 3 on each side...14. P. veitchii
5. Fronds usually above 20 cm. long, lanceolate; or oblong lanceolate; pinnae nuerous (above 20).
6. Fronds to 20 cm. broad, slightly attenuate towards base.........15. P. valdealatum
6. Fronds to 10 cm. broad, rarely broader, not attenuate downward.
7. Sori rounded, quite immersed, costal........................16. P. duclouxii
7. Sori ovate, superficial, not costa...........................17. P. taliense
4. Fronds more or less pubescent or scaly.
5. Fronds below 8 cm. broad, lanceolate.
6. Texture papery, both sides densely pubescent; pinnae below 20 on each side...............................18. P. niponicum
6. Texture thin membranaceous, surfaces only sparcely pubescent; pinnae more numerous on each side.........19. P. yunnanense
5. Fronds above 10 cm. broad, broadly oblong-lanceolate.
6. Pinnae close; sori costal..20. P. bonatianum
6. Pinnae more distant; sori not costal.
7. Rhizome stout; fronds above 30 cm. long.......................21. P. amoenum
7. Rhizome slender; fronds to 15 cm. long.........................22. P. subamoenum
3. Fronds pinnate; pinnae broadly adnate to the rachis (subsect. Marginaria).
4. Areolae about 6-seriate between margin and costa; sori 2-3-rowed on each side..23. P. decurrens
(P. 367).4. Areolae and sori usually single-rowed on each side of costa.
5. Pinnae not dilated at base, usually glabrous or otherwise scaly beneath.

6. Fronds to 10 cm. long, oblong-deltoid.........
......................24. P. erythrocarpum

6. Fronds above 20 cm. long, lanceolate, or ovate-oblong-lanceolate.

7. Fronds above 15 cm. broad.

8. Spaces between pinnae 1 cm. broad.......
..............25. P. meyi

8. Spaces between pinnae much broader......
..............26. P. dielsianum

7. Fronds below 10 cm. broad, lanceolate.

8. Pinnae 3 cm. long, 4 mm. broad; sori somewhat punctate..................
..............27. P. manmeiense

8. Pinnae much longer and above 6 mm. broad; sori superficial.

9. Rhizomatic scales blackish, bristle, stipes straw-colored..............
...........28. P. lachnopus

9. Rhizomatic scales brown, not bristle, stipes castaneous on the lower side
...........29. P. microrhizoma

5. Pinnae dilated at base, under side clothed in dense lepidote ciliate scales.................
........................30. P. thysanolepis

3. Fronds pinnate; at least the lower pinnae more or less stalked, or sessile with a cuneate to truncate or auriculato-cordate, not adnate base (subsect. Schellolepis).

4. Pinnae cuneate at base; areolae and sori 4-6-seriated on each side...........31. P. sampsoni

4. Pinnae rounded at base; areolae and sori uniseriate.
..........................32. P. argutum

4. Pinnae broadly auriculato-cordate at base.

5.Areolae uniseriate; sori small, sparse..............
..........................33. P. mengtzeense

5.Areolae 2-3-seriate; sori large, regular...........
..........................34. P. subauriculatum

2. Veins forming several to numerous, mostly more or less irregular areolae; incuded free veinlets (if present) directed towards the midrib or more generally spreading in various directions, rarely excurrent. Sori round or oblong, very rarely more than 3 X as long as broad (§ Pleopeltis)

3. Rhizome inflated, more or less cylindrical or luberous, soon caverous and inhabited by ants, the scales peltato-orbicular or wanting. Fronds commonly pinnatifid or pinnate, rarely simple (Subsect. Myrmecophylla).

4. Pinnae adnate, dilated at base......................
..........................34a. P. sarcopus

4. Pinnae free, cuneate at base......................
..........................35. P. leiorhizum

3. Rhizome not as in subsect. Myrmecophylla. Scales on the rhizome very rarely roundish or wanting, generally oval, oblong, ovate, lanceolate, linear or subulate.

Fronds simple (Subsect. Stactosia).

4. Main veins indistinct, not rarely wanting (Lepisorus).

5. Sori scattered irregularly.

6. Fronds with stipes above 10 cm. long..............................36. P. superficiale

(P. 368). 6. Fronds none or very short..............................37. P. steerei

5. Sori in 1 row on each side of the costa.

6. Fronds more or less dimorphous fertile fronds longer and narrower than the sterile.

7. Fronds of slight dimorphism the sterile lanceolate, of about the shape as the fertile.............38. P. subrostrutum

7. Frond strongly dimorphous, the sterile ones generally suborbicular of ovate.

8. Fertile fronds above 7 cm. long, below 4 mm. broad........39. P. pyrolifolium

8. Fertile fronds below 4 cm. long, below 4 mm. broad......40. P. drymoglossioides

6. Fronds uniform or nearly so; fertile ones sometimes narrower and longer stalked.

7. Fronds usually to 5 mm. broad.

8. Margin of the frond almost plane; sori large protruding beyong the margin..........................41. P. oblongisorum

8. Margin of the fronds strongly revolute, sori much smaller not protruding beyond the margin, but partly covered by the involuted margin.

9. Fronds to 10 cm. long, and 2 mm. broad, like a cylinder by the strong involution of the margin and bead-liked....................42. P. lewisii

9. Fronds to 40 cm. long, above 3 mm. broad, not bead-like.43. P. eilophyllum

6. Fronds usually above 10 mm. broad (except some vars. of).

7. Sori marginal or intramarginal, fronds above 30 cm. long.

8. Fronds 10-12 mm. broad, slight sinuate, sorus near sinus.44. P. subimmersum

8. Fronds above 2.5 cm. broad, margin entire...........45. P. asterolepis

7. Sori medial or costal, fronds of various length.

8. Fronds chartaceous, broadest below the middle...........46. P. annuifrons

8. Fronds coriaceous or subcoriaceous, not broadened below the middle.

9. Sori confined to above the upper half of the frond.

10. Fronds below 2 cm. broad.

11. Margin revolute, stipes usually very shorter none...................48. P. lineare

11. Margin of frond plane, stipes above a cm. long.....................49. P. oligolepidum
9. Sori run down below the middle.
10. Margin revolute, frond 7-15 mm. broad.50. P. nudus
10. Margin crisped, frond above 2 cm. broad.............................51. P. trabeculatum
4. Main veins distinct nearly or quite to the margin (Pleuridium).
5. Sori in 1 row on each side of the midrib, solitary between the veins, sometimes confluent.
6. Sori more or less immersed, round.
7. Fronds to 15 cm. long, 2.5 cm. broad..........................52. P. udum
7. Fronds to 45 cm. long, above 3.7 cm. broad.............53. P. excavatum
6. Sori superficial, round or oblong.
7. Fronds dimorphous; sterile ones ovate, fertile lanceolate...54. P. rhynchophyllum
7. Fronds uniform.
8. Fronds deltoid-ovate to short oblong-lanceolate, usually above 4 cm. broad.
9. Base of frond rounded, margin repand, sori costal, always uniseriate.....................55. P. griffithianum
9. Base of fronds decurrent, margin not repand, sori often more than 1 row.
10. Fronds broadened at the base............56. P. hemitomum
10. Fronds narrowed at the base..............57. P. ensatum
8. Fronds long lanceolate, usually much narrower.
9. Fronds to 1 cm. broad, under 10 cm. long.......58. P. clathratum
9. Fronds much broader and long.
10. Rhizomatic scales provided on their back with a tuft of long reddish-brown bristles...........59. P. normale
10. Rhizomatic scales destitute of bristles.
11. Frond long lanceolate, gradually decurrent into the stipe.
12. Texture chartaceous, surfaces punctate with small transparent dots.......60. P. fortunei
12. Texture subcoriaceous, surfaces not punctate..61. P. ligolepis

11. Short broad lanceolate, rounded or cuneate at base.
12. Stipes shorter than ~~b~~frond, which not gradually tapering towards apex........ 62. P. engleri
12. Stipes longer than frond, which gradually tapering towards apex............. 63. P. hastatum
5. Sori more than 1 row on each side of costa.
6. Sori one-rowed between principal veins, free or confluent.
7. Fronds above 5 cm. broad, texture subcoriaceous.............64. P. hemionitideum
7. Fronds much narrower, texture chartaceous.. ....65. P. hymenodes
(P. 370). 6. Sori in 2 or more rows between principal veins, 1 to several in arrow.
7. Fronds dimorphous..66. P. hainanense
7. Fronds uniform.
8. Fronds deltoid or hastate.67. P. subhastatum
8. Fronds not deltoid or hastate, but usually narrowed towards base.
9. Texture subcoriaceous, fronds sessile ....68. P. punctatum
9. Texture thin herbaceous or papery, or membranaceous.
10. Stipes approximate................ ....69. P. membranaceum
10. Stipes distant.
11. Fronds suddenly narrowed at base, ...70. P. buergerianum
11. Fronds gradually narrowed at base, stipes rarely to 4 cm. long........................ ...71. P. zippelli
3. Rhizome~~s~~ and scales as in Atactosia; fronds lobed, pinnatifid or pinnate (Chrysopteris).
4. Fronds lobed or pinnatifid, i. e. segments connected by a more or less broad wing.
5. Sori more or less immersed.
6. Wing narrow, segments above 10 on each side, to 12 mm. broad; sori deeply immersed....... ....72. P. longissimum
6. Wing broad, segments not more than 6 on each side, above 2.5 cm. broad; sori shallowly immersed............73. P. phymatodes
5. Sori superficial.
6. Sori in 1 row on each side of the costa.
7. Fronds 3-lobed, rarely digitato-lobed or lobato-pinnatifid in the central lobe.
8. Fronds above 25 cm. long, glandular hairy on both sides.74. P. trisectum

8. Fronds to 15 cm. long, sometimes digitato-lobed, glabrous on both sides......... ....63. P. hastatum
7. Fronds usually pinnatifid, segments at least rarely one on each side.
8. Basal segment deflexed.
9. Margin finely cuspidato-serrate...... ....75. P. malacodon
9. Margin not cuspidato-serrate, but serrulate or subentire.
10. Lobes nearly entire, 10 mm. broad.. ....76. P. ebenipes
10. Lobes serulate above 10 mm. broad.. ....77. P. stewardii
8. Basal lobes not deflexed, but horizontal- or ascending-patent.
9. Margin distinctly wavy-crenate......... ....78. P. crenatopinnatum
(P. 371). 9. Margin serrate or entire or repand.
10. Frond lanceolate on account of adpressedly ascending segments, margin minutely serrate........ ....79. P. cyrtolobium
10. Frond broad oblong, segments erect-panne, margin entire or repand. ....80. P. oxylobum
6. Sori in more than 2 rows or scattered on each side of costa.
7. Texture rigidly coriaceous, frond sessile, base auriculato-dilated................... ....81. P. coronans
7. Texture thin papery or subcoriaceous.
8. Fronds usually 3-lobed, texture subcoriaceous, sorbid green, sori more or less confluent elongate............ ....82. P. pteropus
8. Fronds usually broadly lobato-pinnate, texture thin papery, light green sori small, rounded......................... ....83. P. eurythyllum
4. Fronds pinnate.
5. Pinnae adnate at base.
6. Pinnae entire..........84. P. faberi
6. Pinnae pinnatifid.
7. Fronds pilose on both sides, pinnae 2 mm. broad, not cruciately adnate............. ....85. P. trichophyllum
7. Fronds glabrous, pinnae 8 mm. broad, cruciately adnate at base................. ....86. P. connatum
5. Pinnae free, but sessile or nearly so.
6. Sori in 1 row on each side of costa, and solitary between main veins.
7. Lateral pinnae not more than 4 on each side;

sori medial......87. P. tatsienense

7. Lateral pinnae more, sori nearer to the costa........88. P. wallichianum

6. Sori in 2-4 rows on each side of costa, and usually 2 between main veins.

7. Surfaces pubescent particularly on the midrib and veins beneath, margin wavy........................89. P. himalayense

7. Surfaces glabrous on both sides, margin entire............90. P. lehmanni

2. Venation as in § Pleopeltis. Sori linear or linear-oblong, more than 5 X as long as broad, continuous or interrupted, rarely abbreviated or rounded, more or less oblique to the costa. Fronds simple, lobed or pinnate (§ Selliguea).

3. Fronds simple.

4. Fronds more or less dimorphous.

5. Plants below 15 cm. long, strongly dimorphous, sterile fronds ovate the fertile linear, to 7. cm. long, below 6 mm. broad...91. P. cantoniense

5. Plants at least twice as large, less dimorphous, sterile frond, oblong to lanceolate, the fertile above 1 cm. broad.

6. Texture subcoriaceous, fronds oblong-elliptical, fertile frond to 3.7 cm. broad..................................92. P. peduncutatum

6. Texture membranceous, fronds lanceolate, the fertile ones about 1 cm. broad..................................93. P. cavaleriei

(P. 372) 4. Fronds uniform, rarely somewhat dimorphous.

5. Fronds suddenly narrowed at or somewhat below the middle.

6. Texture papery-herbaceous, main veins zigzag;; ....94. P. wrightii

6. Texture firmer, main veins straight.................................95. P. henryi

5. Fronds not suddenly but gradually narrowed from the middle downward.

6. Texture herbaceous to paperaceous; mains veins commonly fine.

7. Rhizome scales black, fronds above 7 cm. broad............96. P. macrophyllum

7. Rhizome scales brown, fronds to 4 cm. broad.

8. Margin of frond crispate-undulate and obtusely crenate; main veins straight or subflexuose ....97. P. leveillei

8. Margin of frond entire, main veins zigzag. ....98. P. selliguea

6. Texture subcoriaceous; main veins prominent.

7. Frond broadly ovate; sori immersed..........................99. P. heterocarpum

7. Frond lanceolate, sori superficial..........................100. P. mon-chanense

3. Fronds deeply lobed or pinnatifid or pinnate.
    4. Fronds 3-5-digitately lobed.
        5. Fronds always 3-lobed, segments above 20 cm. long ....101. P. triglossum
        5. Fronds usually digitately lobed (sometimes 3-lobed); segments below 10 cm. long.......................................102. P. digitatum
    4. Fronds pinnatifid or pinnate (pinnae usually decurrent)
        5. Segments 4 cm. broad, ovate oblong, sori irregular between main veins.103. P. anceps
        5. Segments below 2 cm. broad, lanceolate; sori regular.
            6. Segments to ½ cm. broad.......................................104. P. flexilobum
            6. Segments much broader.105. P. ellipticum

1. Polypodium hirtellum Blume, Enum. 122, (1828); Mett. n. 14; LKBK. 320; Matthew 379, (1911).

Grammitis pusila Blume, 1828, Fl. Jav. Fil. 109 t. 46 f. 4-6, 1828.
Polypodium lasiosorum Hooker, 1862.
Polypodium adspersum Bl., 1828.

Rhizomes short creeping, scaly; frond entire, 5-7.5 cm. long, 4-6 mm. broad, the pointbluntish, the edge entire, the lower part tapering gradually into the short stipe; texture subcoriaceous; both surfaces thinly covered with long soft brown hairs; veins hidden; sori rounded in two close rows nearer the midrib than the edge, veins free;

Perak, Malesia, North Caledonia, Java, Philippines, Hongkong, China: Kwantung, Szechuwan.

2. Polypodium congeneraum (Bl.) Presl. Tent. 180, (1836).

Grammitis congenera Bl., Enum. 115, 1828; fl. Jav. Fil. 108. t. 46. f. 3. a. b.

A slender fern, epiphytic on the trunk of trees in wood, caudex creeping, covered in pale brown paleae, sending out from all parts fine fibrous roots; stipes 1.2-2.5 cm. long or longer, filiform, not channelled, clothed in shorter but denser hairs darkish sorbid; fronds alternate, close, rather erect or almost arcuate, linear-lanceolate, 7.5-13 cm. long or longer, scarcely more than 4 mm. broad with a long rather
(P. 373).
obtuse acumen, the base strongly narrowed, very entire, margin mostly slightly revolute, costa more prominent beneath, glabrous above, punctate black, pale green below, with sparce short, blackish spreading hairs, Sori numerous, extending from the middle upward as far as 1.2 cm. within the apex, close to the costa, scarcely immersed; oval at first becoming suroundeded by the expansion of capsules.

Malesia, China: Hainan.

3. Polypodium dorsipilum Christ in Warburg Monsunia I. 57, (1900).

Caudex short, caespitose, naked. Frond usually shortly stipitate, lingulato-linear with obtusish apex, 5 cm. long, 2 cm. broad, texture coriaceous, with involute, rarely plane margin, pilose, hairs rigid, short and fragile, more dense along the margin and the midrib beneath. Costa prominent below, quite visible above, lateral veins simple, incospicuous. Sori uniseriate, borne on the veins, minute, not immersed.

Closely allied to P. parasiticum Mett., differs by narrower frond, longer flexile hairs.

S. China.

4. Polypodium mediale Baker, HKBK. 507, (1874); Matthew 380, (1911).

Grammatis attenuata Kze., 1851.
Polypodium parasiticum Mett., n. 16, 1857; HKBK. 319; NIfl. 308 (non L. 1753).
Trichocahymma parasitica Zenker msc., 1857.

Fronds tufted, subsessile, 5-7.5 cm. long, 3.7-5 cm. broad, narrowed very gradually below, the point bluntish, the edge entire or slightly undulated; texture coriaceous; both sides when young rather thickly clothed with long soft hairs; vein immersed, forked, free; sori roundish in two rows, ultimately confluent.

Ceylon, Hongkong, China: Kwantung.

5. Polypodium sikkimense Hieron, Hedwigia 44. 97, (1905).

Polypodium trichomanoides Bedd., Handb. 308; Ferns Br. Ind. t. II; HK. Sp. 4, 178; HKBK. 326.
Polypodium sikkimense var. trichomanoides Clarke, 1880.

Caudex short, erect, paleaceous above, densely rooting with wiry fibres; stipes short, 1.2-2.5 cm. long, densely tufted, fronds 7.5-10 cm. or more long, 4-8 mm. wide, rigid-membraneous, linear, attenuated at both extremities, deeply nearly to the costa pinnatifid or almost pinnate (quite so at the very base), lobes horizontally paten from a broad base, ovate or oblong, entire, subconcave beneath, subddeciduously ciliate with long fibrous or blackish patent hairs; veins solitary in each lobe, simple or forked, each lobe having a single sorus near the base of the veins and costa.

South America, Brazil, Cuba, N. India, China: Szechwan,

New to China.

6. Polypodium repandulum (Kze.) Mett. Pol. 50. n. 54 (1857); HKBK. 328.

Ctenopteris repandular Kze., Zoll. Syst. Verz. 37, 1854.

Stipes tufted, very short, naked; fronds 10-15 cm. long, 2.5-3.7 cm. broad, cut down to the rachis throughout into erecto-patent blunt crenated pinnae 1.2-1.8 cm. broad; texture subcoriaceous; rachis and both sides naked; veinlets simple; sori slightly immersed, filling nearly the ~~1r~~ whole space between the midrib and edge.

Ceylon, S. China.

(P. 374).
7. Polypodium cryptosorum C. Chr. Ind. 520, (1906).

Polypodium decipiens Mett., Kuhn, Linn. 36. 129, (1868); HKBK. 508 (non Hooker) 1862.

Rhizomes short; basal scales lanceolate, brownish, 3-6 mm. long; fronds subsessile, ligulate, 10-30 cm. long, 1.2-2.5 cm. ~~b~~ broad, cut down to a narrow wing into ligulate-oblong lobes, the lowest reduced; texture membraneous, rather fleshy; surfaces thinly clothed with brown hairs, the rachis more densely; veins translucent; 6-14-jugate, all or upper soriferous; sori immersed, submarginal.

Sumatra, Borneo, Malesia, China: Kwangsi.

Species new to China.

8. Polypodium subfalcatum Bl. Enum. 130, (1828); Fl. Jav. Fil. 186 t. 87. A. B.; HKBk. 328; Bedd. Handb. 314; Ferns S. Ind. t. 166; NPfl. 310; Matthew 383, (1911).

Ctenopteris subfalcatum Kze., 1848.
Polypodium sinicum Christ, 1899.

Stipes densely tufted, under 2.5 cm. long, thinly clothed with sorft spreading shairs; fronds 15-20 cm. long, 2.5-3.7 cm. broad; pinnae close, spreading, rather sharply toothed from one-third to half way down, decurrent at the base, the lower ones gradually reduced; texture papyraceous-herbaceous; both sides slightly villose; veinlets simple; sori apical on the veinlets, 1 to each tooth or lobe of the pinnae.

N. India, Malesia, China: Szechwan.

Closely allied to P. repandulum, differs by soft texture, parts being much more hairy, margin being serrated instead of crenulate and by the sori being not immersed.

9. Polypodium simulans Baker, Kew Bull. 13, (1906); Matthew 383, (1911).

Rhizome slender, creeping epigaeuous, clothed with ovate acute imbricate sorbid brown paleae; stipes segregated, erect, short, straminaceous, naked; lamina lanceolate, simply pinnate, 30 cm. long, 5-6.2 cm. broad, rather firm in texture, green and glabrous on both surfaces, rachis straminaceous, slender, naked; pinnae linear, 3-3.6 cm. long, 4 rachis straminaceous, slender, naked; pinnae linear, 3-3.6 cm. long, 4 mm. broad, entire, adnate at the base, the lower ones not reduced, costa slender, black, veins erecto-patent, evident, forked, not extending to the margin; sori small, globose, superficial, midway between costa and margin, uniseriate.

Yunnan, on Limestone rocks.

Differs from India Polypodium microrhizoma Clarke by free veins.

10. Polypodium vulgare Linn. Sp. 2. 1085, (1753), HKBK. 334, Christ 83; NPfl. 311. Matthew 384 (1911).

Ctenopteris vulgare Newm., 1846.
Polypodium australe Fee, 1850-52.
Polypodium cambricum L., 1753.
Polypodium vulgare var. Eatoni Baker, 1879.

Rhizomes stout, the scales bright-ferruginous; stipes 5-10 cm. long, firm, erect, stramineous; fronds 15-30 cm. long, 7.5-15 cm. broad, cut down nearly or quite to the rachis into close entire or slightly toothed usually blunt pinnae 6-12 mm. broad; texture herbaceous or subcoriaceous; both sides naked, veinlets pinnate; sori large, uniserial.

A fern widely dispersed all over the world; Cape Colony, (P. 375).
Japan, China: Tibet, Szechwan, Manchuria.

A quite variable species to which several names have been given by different botanists.

11. Polypodium stenopteris Baker, JoB. 43, (1879); Christ, Ann. Jard. Buit. II. 5. 122 t. 5. f. 4, (1905).

Stipes 30 cm. long, stramineous upward, naked, provided towards base with linear-subulate, dark-brown paleae; lamina deltoid, cm. long and broad, simply pinnate, subcoriaceous, green and glabrous on both surfaces, rachis slender, stramineous, subnaked; pinnae lanceolate, acuminate, denticulate, shortly petiolated, base rounded at both sides lower ones 17-20 cm. long, 1.6-1.8 cm. broad downward; primary veins prallel, veinlets simple, ascending, 3-4-jugate; sori small, globose, superficial, 3-4 pairs, loosely placed.

Differs from Polypodium lineatum Colebr. by veinlets and sori, the latter of which laxly 2-4-paired.

Borneo, China: Yunnan.

12. Polypodium convolutum Baker, Kew. Bull. 12, (1906).

Caudex erect; stipes capillary, caespitose, 2.5- cm. long, clothed with subulate spreading brown paleae; lamina lanceolate, bipinnatifid, 7.5-15 cm. long, 1.2-1.8 cm. broad at the middle, attenuate towards the base, membranaceous, elastic, green on both surfaces, glabrous above, pilose beneath; pinnae contiguous, sessile, lanceolate, the middle ones 8-10 mm. long, 3 mm. broad, lobes ovate, obtuse; the lower pinnae gradually smaller; veins in the lobes simple, apex not attingent; sori globose, superficial, placed near the base of the lobes.

Yunnan

An epipthytic fern, differs from Polypodium achilleaefolium Kaulf. by nearrower fronds and ovate, obtuse lobes.

13. Polypodium dareaeformioides Ching, Sinensia 1: 13 (1929).

Rhizome wide-creeping, thick, densely covered in imbricate shining brown paleae, which are to 4 mm. long, broadly rounded at base, gradually narrowed upward into a linear-subulate apex with ciliate margin, attached to the rhizome by a dark brown centre of the broad base. Stipes remote, rigid, to 18 cm. long naked, lustreous castaneous and so as the entire rachis, articulated to the rhizome. Fronds deltoid, shortly acuminate 22 cm. long, 15 cm. broad at base, quadripinnate; pinnae about pinnae about 10 on each side, the lower ones much the largest, petiolate, erecto-patent, 8-19 cm. long, 6-7 cm. broad, deltoid, secondary rachis naked, shining castaneus, narrowly winged towards apex; pinnules about 10 on each side, oblong-lanceolate, petiolulate, costa winged throughout, dark castaneus, 3-4 cm. long, 1.2-1.5 cm. broad, the upper ones gradually smaller pinnate, the pinnules of third order oblong, on a winged petiolute, costule shaded castaneus near base, pinnate, segments linear-oblong, clavate, 2-3 mm. long, often bifid into short lobes of unequal length; texture thin herbaceous, veins as in P. dareaeforme Hooker, except more obscured, diaphanous, Sori placed mostly some distance below the branching, and in the middle of segments small, round, about 1/3 as broad as the segment.

Kwangsi.

Species most closely allied to himalayan species P. dareaeforme Hooker, differs only smaller dimension, shorter, broader and deltoid pinnae and, particularly, in stipes, rachis secondary rachis costa and the base of costules being always castaneus brown and much smaller sori which are not extending beyond the margin of segments. These characters

(P. 376).
my perhaps be mere geographical modifications, yet they are so constant in all the specimens observed that it may be well considered as distinct from the Himalayan type, which, so far, yet been unrecorded from China.

14. Polypodium veitchii Baker, Gard. Chr. 14. n. s. 494, (1880); Takeda in Notes Bot. Gard. Edinb. 8. 296, (1915).

Polypodium glaucopsis Franch., 1885; C. Chr. Ind. 350, (1906).
Polypodium senanense Maxim., 1886; C. Chr. Ind. 563, (1906).
Polypodium shensiense Christ, 1898, C. Chr. Ind. 564.

Rhizome slender, creeping, basal paleae dense, spreading, pale brown, lanceolate, very thin membranaceous; stipes very slender, stramineous, 2.5-10 cm. long, glabrous; fronds deltoid, or deltoid-ovate, pinnatifid to a narrow wing into 3-5 or more lobes on each side 2.5-3.7 cm. long, rather thin in texture, glabrous, pale green often glauscent, lobes oblong or almost ovate, 6-8 mm. broad obtuse, minutely inciso-crenate or minutely serrulate, towards apex, the lowest lobes not rarely deeply cut into obtuse lobules; main veins fine, distinct, usually jointed so as to form a single row of areolae; sori superficial, globose, large in single row nearer the midrib than the edge.

Japan, Formosa, China: Yunnan, Shensi, Hupeh.

This species generally grows among mosses on moist rocks at a compratively high altitude, with very thin membranaceous texture, but specimens from an exposed habitat may have chartaceo~~us~~-subcoriaceous and very firm substance.

15. Polypodium valdealatum Christ, Bull. Boiss. 7. 4, (1899); Matthew 383, (1911).

Rhizomes woody, creeping, thick as goose's ~~as~~ quill, coveredwith patent brown setaceous short rigid scales; stipes solitary, 28 cm. long, slender, rufo-stramineous, and like rachis and costa covered with oval obtuse brown sparse scales 2 mm. broad; fronds 19 cm. long, 20 cm. broad, horizontal, finely attenuate, ovate-acuminate, simple pinnate under the pinnatifid apex, pinnae numerous (25 on each side), 1.5 cm. apart and with angular broad sinuses, 10 cm. long, 1 cm. broad, base broadest and adnate to a narrow continuous winged rachis caudate-acuminate, slightly crenato-serrate, teeth procumbent, naked above; texture thin herbaceous, color light-green; lateral veins numerous (28-30 on each side of the costa) forming conspicuous broad areolae near base, areolae irregular towards margin and with free veins near it; sori numerous (28-30 on each side), rounded, 2 mm. across, placed in costule areolae, slightly immersed.

Yunnan.

16. Polypodium duclouxii Christ, Not. Syst. I. 34, (1909); Matthew 378, (1911).

Rhizome creeping, stout, thick as a swan's quill or thicker, nody dark brown, clothed with lanceolate-subulate, dark-brown scales, o~~b~~therwise whole plant glabrous; stipes solitary, rosy-stramineous, lucid, 20 cm. long, thick as raven's quill. Fronds 30 cm. long, 9.5 cm. broad, lanceolate, not attenuate towards base, pinnatifid; rachis plance, reddish, pinnatifid to a wing 1-3 mm. broad; pinnae about 22 on each side below the pinnatifid apex, 5 cm. long, 8-10 mm. broad, entire or minutely serrate towards apex, broadly adnate at base, with acute apex, separated by ovate sinuses 4 mm. broad; veins oblique, oblong 3 mm. long, uniseriate, in areolae are included soriferous veinlets, veinlets between the areolae and margin are both forked and simple,
(P. 377).
alternate, free, extending to the margin; sori about 20 on each side near costa, contiguous, rounded, ochraceous, 1.5 mm. broad, quite immersed; texture herbaceous, color light green.

Yunnan.

Habit of Polypodium nipponium Mett. but much different in sori and rhizome.

17. Polypodium taliense Christ, Bull. Soc. Fr. 52, Mem. I. 13. (1905); Matthew 383, (1911).

Close to Himalayan Polypodium atkinsoni. C. Chr., but differs in pinnae being not serrulate but obtusely crenate, sori not close to the midrib, contiguous, but ovate, less remote, and fronds broader in outline. Rhizomes clad in subulate brown scales; pinnae diaphanous, with uniseriate areolae and sori, veins manifestedly obeneous.

India, Yunnan, Szechwan.

18. Polypodium niponicum Mett. Ann. Lugd. Bat. 2. 222, (1866); FKBA. 341; Christ 93; NPfl. 311; Matthew 381, (1911).

Polypodium niponicum Mett. var. leavipes Christ.
Polypodium longkyense Ros., Fedde Repert. 13, 134, 1914.
Polypodium bodineri Christ, Bull. Geogr. Bot. Mans. 203, 1902.
Polypodium silvestrii Christ, Not. Syst. 1: 58. 1908; Matthew 383. 1911.

Rhizomes horizontally creeping epigaeous, thick as goose's quill subglabrous, covered by whitish bloom; stipes stramineous; fronds 12-25 cm. or over 35 cm. long, 2-5 cm. broad, sublanceolate simply--pinnatifid, cut down nearly to the rachis into about 20 pairs of spreading linear-oblong entire obtuse pinnae, of which the lowest are free, slightly reduced and deflexed; texture papyraceous, both sides densely pubescent; areolae in a

single row along costa, sori uniserial quite near the midrib of the pinnae, roundish brown; inducium absent.

Birma, Japan, China: Hupeh, Szechwan, Kiangsi, Chekiang, Kiangsu, Anhwei, Yunnan, Fukien, Hunan.

A very uniform species. The differential characters ascribed to var. laevipes Christ fit specimens from Japan very well.

19. Polypodium yunnanense Franch. Bull. Soc. Fr. 32. 29, (1885); Matthew 384, (1911).

Goniophlebium yunnanense Bedd., 1892 32. 29 (1885).

Rhizomes stout, creeping, densely clad in fuscous closely imbricate linear-subulate scales; stipes 10-13 cm. pinkish, stramineous, nearly glabrous; lamina 20-30 cm. long, 6-8 cm. broad at base, lanceolato-deltoid, in outline, shortly and sparcely pubescent on both sides, pinnatifid to a narrow wing; pinnae lanceolate-linear, acute or subobtuse, obscurely crenate, about 7 mm. broad at base vein and veinlets fine, impressed; rachis and costa with lanceolate, hair-pointed scales; areolae and sori in a single row.

Allies to Polypodium amoenum Wall. in venation, differs in being shortly pubescent on both surfaces of lamina and rachis and in obtuse or subacute, pinnae.

Yunnan.

20. Polypodium bonatianum Krause, Hedwigia 54, 207-208, t. 4. L. (1914).

Rhizome and the lower portion of the stipes not seen. Stipes covered with brown glabrescent articulate hairs when young and channelled above, stramineous and teret beneath, about 1.5 mm. across; lamina 22.5 cm. long, 12.5 cm. broad, oval in outline, linear near the
(F. 378).
apex, base subattenuate, pinnatifid, texture membraneous, the upper side shining olive-green, clothed with whitish articulate dense hairs along the margin of segments, the under side paler and glabrous; segments 17-jugated, linear-lanceolate, acuminate, margin slightly serrate, approximate, basal wing 1-2 mm. broad, confluent, sinuses narrow, rounded, the upper ones patent, the lower ones subhorizontal, the lowest ones reflexed, the middle ones much the largest, 6.5 cm. long, 1.1 cm. broad at base; rachis clothed above with similarly articulate dense hairs, carinato-canaliculate, the under side stramineous, terete, sparcely clothed with brown, clatrate, triangular scales about 22 mm. long, 8 mm. broad at base, costa thick, clothed all way down with articulate hairs. Sori numerous, confert, apical on the free veinlets, uniserial, approximate to the costa, not confluent; spores yellow, pellucid, bilateral.

Yunnan; Tong-tchauan.

Allied to P. amoenum Wall., but its closer pinnae and the manner of distribution of the sori easily distinguish it from amoenum its near relative.

21. Polypodium amoenum Wall. List n. 290, (1828); HkBk. 341;
Christ 93; NPfl. 311; Matthew 377, (1911).

Marginaria amoenum Presl., 1836.
Goniophlebium amoenum J. Sm., 1840.

Rhizomes stout, wide-creeping densely clothed with spreading fibrillose dull brown scales; stipe 12-30 cm. long, firm, erect, naked; fronds 30-60 cm. long, 12-30 cm. broad, cut down nearly to the rachis into numerous entire or slightly toothed pinnae 5-15 cm. long, 6-18 mm. broad, narrowed gradually from the base to an acute point, the lowest deflexed; texture herbaceous, both sides naked, lustrous green, or the rachis beneath rather scaly, areolae and sori in a single series.

N. India, Formosa, Hongkong, Korea, China: Kansu, Szechwan, Kweichow, Yunnan, Anwhei.

Var. pilosa Ros. Fedde Repert. 13, 134, (1914).

Lamina broadly deltoid to 27 cm. long and equally wide, upper surface or both surfaces densely pilose.

Kweichow; Pin-fa.

Var. latedeltoidum, Christ, Bull. Geogr. Bot. Man. xvii. 142, (1907); Matthew 377, (1911).

Differs from the type in fronds being very broadly deltoid; stipes 20 cm. long, frond 20 cm. long, 23 cm. broad at base; pinnae 18 mm. broad, margin repando-dentate and monstrosely lobated like P. vulgaris f. semilaceri Moore.

Kweichow.

22. Polypodium subamoenum Clarke, Tr. Linn. Soc. II. Bot. i.
550 t. 82 f. 2. (1880); Christ 93.

Goniophlebium subamoenum Bedd., Handb. 317. 1883.

Rhizome slender, densely clothed with grey-brown lanceolate-subulate scales, which are subappressed, never hair-pointed; near the base of the main rhachis are sometimes ovate or lanceolate scales; stipes about 5 cm. long: fronds 15 cm. long, deeply pinnatifid to the rachis lower pinnae not quite free, much abbreviated and deflexed;
(P. 379).
costal arches of the main rhachis continued nearly or quite to the base of the frond; main rhachis above glabrous or puberulous.

N. India, China: Kansu, Hupeh, Shensi.

Very close to P. amoenum, from which it is separable by its slender rhizome and small size. The frond of P. amoenum is broader, less fully pinnates, the pinnae less markedly serrate.

23. Polypodium decurrens Raddi, Opusc. Sci. Bot. 3, 287, (1819); Pl. bras. I. 23 t. 33, (1825); HkBk. 349; Christ 96; NPfl. 315.

Campyloneurum decurrens Presl., 1836.
Cyrtophlebium decurrens J. Sm., 1841.

Rhizomes wiry, rather slender, the scales deciduous; stipes 15-30 cm. long, firm, naked; frond usually with several erecto-patent pinnae on each side, which are 20-30 cm. long 3.7-5 cm. broad, the point acuminate, the base narrowed, the edge nearly entire; texture subcoriaceous; colour dark-green; both sides glossy; areolae about 6 between the midrib and edge, with 2-3 sori on each side.

East India, Brazil Peru, China: Kweichow;

New to China.

24. Polypodium erythrocarpum Mett; Kuhn, Linn. 36. 135, (1869); HkBk. 511; NPfl. 312; Matthew 378, (1911).

Coniophlebium erythrocarpum Bedd., 1876.

Rhizomes 1 mm. thick, glaucous, firm, wide-creeping; scales lanceolate, dark-castaneous, minute; stipes 7.5-10 cm. long, naked, stramineous; very slender; fronds oblong-deltoid, 7.5-10 cm. long, 3.7-5 cm. broad, caudate, simple pinnate; pinnae 5-6-jugate, ligulate, blunt, 6-8 mm. broad, obscurely repand, adnate, only the lowest narrowed at the base on the lower side, scarcely shortened; texture rigidly subcoriaceous rachis and costae below pilose; veins raised, very distinct to the edge; areolae and sori uniserial, the latter near the midrib, not crowded.

Sikkim, China: Szechwan - Omei Shan.

25. Polypodium Leyi Christ, Not. Syst. I. 35, (1909); Matthew 381, (1911).

Rhizomes thick as swan's quill, creeping, clothed with setaceous dark-brown scales; stipes thick as raven's quill, basal scales lanceolate subulate, 5 mm. long, rigid, lucid, dark-brown, reddish-stramineous, 16 cm. long; fronds deltoid-oblong, 25 cm. long, 18 cm. broad at the base; pinnate under the terminal pinna with lobed base. Rachis and costa stramineous; rachis very narrowly winged, furfuraceous, pinnae (the lower one much the longest) horizontally patent, about 20 on each

side, 1 cm. far apart, lanceolate-linear, the lower ones with attenuate and cuneat base, the upper ones broadly adnate, subcordate at the posterior side, dilated upward at the anterior side acute but minutely crenato-serrulate, acuminate, 9 cm. long, 1 cm. broad, veins slender,oblique, diaphanous, areolae ovate, uniseriate, 2 mm. long,with free veinlets between them and margin, areolae with included spriferous veinlets sori medial, about 30 on each side, minute, ovate, ochraceous, 0.75 mm. long, not immersed, under surface furfuraceousscaly, conspicuously brown, upper surface glabrous texture papery, color - light green.

Yunnan.

(P. 380).
26. Polypodium dielsianum C. Chr. Ind. 522, (1906); Matthew 378, (1911).

Polypodium leuconeuron Diels, Engl. Jahrb. 29, 205, 1900; Fl. Cent. China 203 (non Christ 1900).
Polypodium wilsonii Christ, Bull. Geogr. Bot. Man. 104, 1906.

Rhizome creeping, clad in dark gray lanceolate-subulate paleae; stipes 8-12 cm. long, stramineous, glabrous; lamina ovate-deltoid, papery, pinnate, 25-30 cm. long, 15-22 cm. broad; pinnae 13-20 pairs, spreading, with broad intersticial spaces, adnate, from the base upward dilated linear subfalcate, serrulate towards the apex, 10 cm. long 8-10 cm. broad, the lower ones reduced, rachis and costa; plane-white sori and areolae uniseriate, sori placed midway between costa and margin.

S. W. Szechwan: Henchuan.

Allied to Polypodium amoenum Wall, but its peculiar shape of the base of pinnae and also the broad space between the pinnae distinguisheds it sharply from its relative. In habit, like a small form of P. subauriculatum Bl.

27. Polypodium manmeiense Christ, Bull. Boiss. 6. 870, (1898); Matthew 380, (1911).

Polypodium scalare Christ, Bull. Soc. Fr. 52. Mem. 1. 14, 1905.
Polypodium pseudo-dimidiatum Christ, Bull. Soc. Fr. 52. Mem. 1. 14, 1905.

Rhizomes slender, creeping, clothed with lanceolate fibrillose brown spreading scales; stipes remote, weak but erect, 8-15 cm. long, stramineous; the entire plant naked; leaves 25-30 cm. long, 3-7 cm. broad, ovate-oblong from base, dentate at apex, long acuminate, pinnate; pinnae patent, about 25 on each side, [illegible] cm. long, 3-4 mm. broad, linear, rather obtuse, base dilatedly adnate, entire, with open sinuses, but

the upper ones touching each costa, usually with open free veinlets towards margin rarely provided with arches below ebensis; sori ovate, small, in the center of the areolae, uniseriate, small, 12 on each side of the costa, pale flavescent, slightly sunk and obscurely punctated on the upper surface.

East Tibet, Szechwan, Yunnan.

Generally the veins are free as in Eupolypodium and in habit the species resembles slender forms of P. vulgare. Its nearest relative is evidently the Himalayan P. lachnopus Wall., which it resembles in size and habit, but the scales of the rhizome are not hair-pointed. Texture generally very thin.

28. Polypodium lachnopus Wall. Lisban n/. 210, (1828); HK. Ic. pl. t. 952, 1854; Mett. n. 113; HKBK. 342; MPfl. 312.

Goniophlebium lachnopus J. Sm., 1840.
Polypodium fieldingianum Kze., Mett. n. 114, 1857.
Schellolepis lachnopus J. Sm., 1875.

Rhizome wide-spreading, densely clothed with spreading black bristly scales; stipes 5-10 cm. long, slender, naked; fronds flaccid, 30-45 cm. long, 7.5-10 cm. broad cut down nearly or quite to the rachis into numerous spreading slightly toothed pinnae 3.87-5 cm. long, 6 mm. broad; texture papyraceo-herbaceous; both sides naked or the rachis beneath slightly scaly; areolae and sori in a single series.

N. India China.

29. Polypodium microrhizoma Clarke Tr. Linn. Soc. II. Bot. I. 551, (1879); HKBK. 511, (1874); Matthew 381, (1911).

Goniophlebium microrhizome Bedd., 1876.

(P. 381).
Rhizomes 2 mm. thick, firm, wide-creeping; scales minute, lanceolate; stipes 10-13 cm. long, naked like the rachis, castaneous on the lower side; fronds lanceolate, 22-30 cm. long, 7.5-10 cm. broad, simply pinnate; pinnae 20-30-jugate, patent, lanceolate, acute, 6-8 mm. broad, distantly incised, all except the lowest dilated at the base; texture moderately firm; surfaces green, naked; areolae and sori uniserial, the latter near the midrib, not crowded.

Himalayas, China: Yunnan.

30. Polypodium thysanolepis A. Br.; K. Linn. 20, 392, (1847); Mett. n. 101; HKBK. 512; Kuhn, abh. Nat. Ges. Halle 11. 21; Christ 91.

Polypodium aspidiolepis Baker, JoB. 26, 1887; Matthew 377, (1911).
Polypodium excavatum, var. aspidiolepis, Baker, Ann. Bot. 5. 474, (1891).
Goniophlebium aspidiolepis Moore, 1862.
Lepicystis thysanolepis Diels, 1899, NPfl. 323.
Polypodium purpusii Christ, 1907.

Rhizomes slender, 3 mm. thick, firm, wide-creeping; ~~sca~~ scales dense, minute, lanceolate, pale-brown; stipe stiff, erect, sacaly, 7.5-30 cm. long; fronds lanceolate, 7.5-23 cm. long, 5-10 cm. broad, simply pinnate; pinnae ascending, ligulate, blunt, entire, distant, 6-12 mm. broad, all except the lowest ones dilated at base, the lowest not reduced; texture thick, subcoriaceous; upper surface dull-green, mostly naked the lower densely clothed with ciliated lepidote minute scales with a brown centre and broad scariose border; areolae and sori uniserial.

Arizona, Peru, Cuba, Jamaica, Luzon, China: Yunnan,

New to China.

31. Polypodium sampsoni Baker, Ann. Bot. 5. 471, (1891); Matthew 382, (1911).

Rhizomes slender, wide-creeping, firm, glabrous, with only a few lanceolate membraneous paleae. Stipes naked, 1.2-5 cm. long; fronds oblong, simple pinnate, moderately firm, glabrous, above 30 cm. long, 17-20 cm. broad; pinnae 11, oblong-lanceolate, entire, cuspidate, sessile, cuneate at the base, the largest 10-12.5 cm. long, 2.5- cm. broad, the lowest dwarfed, main veins erecto-patent, distinct to the edge 2 mm. apart; areolate and sori 4-6 between each main vein, the latter superficial, globose.

Canton: West River.

Near Polypodium fraxinifolium Jacq.

32. Polypodium argutum Wall, List n. 308, (1828); HK. Sp. 5. 32, (1863); HKBK. 511; NPfl. 312.

Marginaria arguta HK., 1838.
Goniophlebium argutum J. Sm., 1840.
Schellolepis arguta J. Sm., 1875.

Rhizomes 3 mm. thick, firm, wide creeping; scales minute, linear, subulate, dark-brown; stipes 7.5-15 cm. long, naked, castaneous-stramineous; fronds suberect, oblong-lanceolate, 30-60 cm. long, 20-30 cm. broad, simple pinnate; pinnae 10-20-jugate, ligulate-acuminate, faintly inciso-crenate, 1.2-1.8 cm. broad, many, free, distant, lowest not reduced, texture membranaceous, surfaces bright-green, naked; areolae and sori uniserial, the later not close, nearer the midrib than the edge.

Himalayas, China: Kweichow.

New to China.

(P. 382).
3.Polypodium mengtzeense Christ in Bull. Boiss. 6: 869 (1989); C. Chr. Ind. 544 (1906); Matthew in Journ. Linn. Soc. 39: 381 (1911).

Polypodium aspersum Baker, Kew Bull. (1898) 231 (non P. adspersum Schrad. 1818, nec Blume 1828.
Polypodium argutum Wall. var. khasianum Clarke, Ferns N. Ind. (1880).

Rhizome creeping, epigaeous, flexuose, 4 mm. thick, clad in moderately dense deltoid-subulate dark brown clathrate scales; stipes 1.4-2 cm. apart, slender, naked, shining, pale stramineous, 9-12 cm. long; frond lanceolate-oblong, simply pinnate, 26-35 cm. long, 12-15 cm. broad, texture almost membranaceous, green and glabrous on both surfaces, rachis slender and naked; pinnae 6-10 on each side under the long attenuate deeply inciso-crenate apex, subopposite, 2-2.5 cm. apart, lanceolate, acuminate, obscurely inciso-crenate, base obliquely truncate, somewhat cordate, dilatato-auricled on both sides, auricles rounded, the lower ones more developed thanthe upper, the lower pinnae as long as the upper ones, horizontally or erect patent, free, sessile, with the lower auricle usually imbricating the rachis, 6-8 cm. long, 8-14 mm. broad above the base, the upper ones more or less adnate, the uppermost one pair below the apex broadly adnate and decurrent some distance along the rachis, the terminal pinna the largest 9-12 cm. long) and generally deeply inciso-crenate near the base; veins slender but distinct, costa raised on both surfaces, areolae large, uniseriate along both sides of the costa usually with 1 included soriferous veinlet, or very rarely 2, or forked at the apex, the other veinlets free, falling some distance short from the margin, all with clavate apex; sori small, globose, superficial, sparsely disposed midway between the costa and margin.

Yunnan.

A very distinct, elegant fern and evidently a close ally to P. subauriculatum Blume, from which differs by slender habit, smaller size, fewer and shorter pinnae of still thinner texture, uniseriate large areolae along the both sides of the midrib and a few sparse smaller and remote sori midway between the midrib and margin. It was discovered by A. Henry in Mengtze, Yunnan, on wooded rocks or on the trunk of trees. P. aspersum Baker is congeneric with Christ's type.

34. Polypodium subauriculatum Bl. Enum. 133, (1828); Fl. Jav. Fil. 177; HKBK. 344; Christ 93; NPfl. 318.

Goniophlebium subauriculatum Presl., 1836.
Polypodium pallens Bl., Fl. Jav. Fil. 178 t. 84 f. 1. 1829.
Polypodium serratifolium Diels, 1899, NPfl. 312.

Rhizomes wide-creeping, clothed with small dull-brown hair-pointed linear-subulate scales; stipes 15-30 cm. long firm, erect, naked, glossy; fronds 60-90 cm. long, 24-30 cm. broad, oblong-lanceolate, decurved, pinnae 10-15 cm. long, 1.2-2.5 cm. broad, the lower ones distant, widened, the edge entire or slightly toothed, sessile, the base rounded or even auricled; texture herbaceous or subcoriaceous; rachis and both sides naked; areolae in 2-3 rows, sori uniserial, distinctly immersed.

Australia, Philippines, Khasia, Samoa, Formosa, China: Yunnan, Szechwan.

34a. Polypodium sarcopus de Vries et Teysm; HKBK. 514; Christ 112; NPfl. 321; Matthew 382, (1911).

Stipes 15-23 cm. long, stout, erect, naked, stramineous; fronds oblong, simply pinnate, 30-45 cm. long, 15-20 cm. broad; pinnae 20-30-jubate, ligulate, blunt, erecto-patent, entire, 0.9-1.6 cm. broad,
(P. 383).
broad, adnate, dilated at base, lowest not reduced; texture subcoriaceous, surfaces naked, glabrous; areolae fine, irregular, immersed; sori 1-serial, midway between midrib and edge of pinnae, immersed in a pit with a distinctly defined broader, and forming much-raised papillae above.

Celebes, C. China.

35. Polypodium leiophizum Wall. List n. 303, (1828); Mett. Fil. Lips. 37 t. 25 f. 7. (1856); Pol. n. 134; HKBK. 369; Christ 115; NPfl. 321; Matthew 380, (1911).

Phymatodes leiorphizun Presl., 1836.
Drynaria leiorhiza J. Sm., 1841.
Polypodium cuspidatum Don, 1825, Prod. Fl. Nepal. 2. 1825.

Rhizomes very thick, fleshy, clothed scarcely with ovate adpressed peltate scales; stipes 30-60 cm. long, firm, erect, shining wory; fronds 2/3-1.33 m. long 30-60 cm. broad, simple pinnate; pinnae narrowed at the base, the lower ones stalked, upper ones broadly decurrent, adnate near the apex, 15-30 cm. long, 1.8-3.7 cm. broad, lanceolate, broadest above the base, the apex long-acuminate, the edge entire; texture subcoriaceous, surface naked; areolae fine, uniform, with copious free veinlets; sori large, 3-4 mm. across, slightly immersed and distinctly punctated on the upper side of the pinnae, in a row nearer to the midrib on each side.

N. India, China: Kweichow, Kwantung, Yunnan.

36. Polypodium superficiale Blume, Enum. 123, (1828); Fl. Jav. Fil. 136 t. 56 f. 1.; HKBK; 355; Christ 104; NPfl. 315; Matthew 383, (1911).

Polypodium superficiale Hooker, Sp. 5, 71 (pt.); Clarke Ferns. N. Ind. 557, excl. var.

Pleopeltis superficialis Bedd., Ferns S. Ind. t. 75; Handb. 350.

Polypodium superficiale var. australiense Bail., 1891.

Polypodium brachylepis Baker, Garden Chr. n. s. XIV. 494, 1880.

Polypodium normale var. sumatranum Baker, 1880.

Polypodium nigrocinctum Christ, Bull. Boiss. vi. 874, 1898.

Rhizomes woody, wide-creeping, the scales lanceolate, spreading, brown, shining; stipes 10-15 cm. long, firm, naked, often curved; fronds simple, 15-30 cm. long, 2.5-5 cm. broad, narrowed gradually at both ends, the edge entire; texture subcoriaceous; both sides naked; areolae fine, irregular, with free veinlets; sori copious, scattered irregularly.

N. India, Tsus-Sima, Japan, Java, India, Queensland, Formosa, Korea, China: Kweichow, Chekiang, Szechwan, Fukien, Kwantung, Hupeh, Kiukiang.

Nearest to P. buergerianum Miq., differs in larger size, thicker texture, longer stipes with the basal portion quite unwinged and, particularly, in the large pale brown, ovate obtuse more or less adpressed rhizomatic scales.

Var. attenuata Ros. Fedde Repert. 13, 134, (1914).

Rhizomatic paleae narrower, lamina membranaceous, light green, angustate, to 40 cm. long, 2 cm. broad or narrower, veins prominent on both sides, quite conspicuous; sori 1-3-seriate; lamina long-stipitate (stipes 2-5 cm. long), thus distinguishable from var. unguina Baker.

Kweichow: Gan-tchuen.

(P. 384).

Var. chinensis Ros. Fedde Repert. 13, 134 (1914).

Lamina short-conic at base, lanceolate or ovate-lanceolate, slightly repand; veins fine, quite conspicuous, lamina to 24 cm. long, 27 mm. wide.

Kweichow, Szechwan, Yunnan.

37. Polypodium steerei Harr. Journ. Linn. Soc. 16. 32, (1878); Matthew 383, (1911).

Polypodium tokinense Baker, JoB. 266, 1890.

Polypodium playfairii Baker, Ann. Bot. V. 474, 1891.

Rootstock slender, short-creeping, paleae lanceolate, dark-brown; stipes very short or none; frond 12-30 cm. long, 2.5-3.7 cm. broad, above the middle, simple, oblong-loblanceolate, obtuse to acuminate, gradually tapering downward; margin entire, slightly thickened; surfaces naked, texture coriaceous; midrib strong, main veins indistinct or somewhat conspicuous sori copious, small, irregularly scattered; on the tip of free or back of united veinlets; on the upper half of ~~th~~ third of the frond; areolae abundant, hexagonal, irregular.

Luzon, Formosa, Tonkin, China: Kweichow.

Allied to P. punctatum, but characterized by very thick fleshy broadly oblanceolate, sessile frond, with numerous minute round sori.

38. Polypodium subrostratum C. Chr. Ind. 567, (1906); Matthew 383 (1911).

Polypodium rostratum Hooker, Ic. Pl. t. 953 (1854); HKBK. 353 (non Burm. 1768. nec Cav. 1802 nec alior).
Pleppeltis rostratum Bedd., 1867, Handb. 345 f. 193.
Phymatopsis subrostratum J. Sm., 1875.

Rhizomes filiform, wide-creeping, the scales small, fibrillose; stipes 2.5-5 cm. long, firm, naked; frond lanceolate-acuminate, somewhat dimorphic, 5-10 cm. long, 1.2-2.5 cm. broad, narrowed gradually to both ends, the sterile ones broader and half as long as the fertile, very shortly stalked, the edge entire slightly revolute; texture ceriaceous, both sides naked; veins immersed, no distinct main veins, areolae fine, copious, with free veinlets; sori large, in single rows not far from the midrib.

Bhootan, Mishmee, Himalayas, Kasia, Hongkong, China: Kwantung, Hupeh, Yunnan, Kiangsu, Chekiang-Tien-tai Shan.

39. Polypodium pyrolifolium Goldm. Nova Acta 19. suppl. 1. 453, (1843).

Marginaria nummularia Presl., 1836.
Crypsinus nummularia Presl., Epim. 123, 1849.
Polypodium nummularia Mett., 1857, n. 199; HK. Sp. 5. 37; HKBK.340.
Goniophlebium nummularia Moore, 1857.

Rhizomes wide-creeping, slender, the scales linear-subulate, ferruginous; fronds distant, the barren ones suborbicular, 1.2-1.8 cm. long, nearly as broad, on the short slender stipes; texture coriaceous; both side naked; veins immersed, very obscure; fertile fronds 7.5-10 cm. long, 3 mm. broad, on stalks nearly as long.

Luzon, China: Kwantung.

New to China.

40. Polypodium drymoglossoides Baker, JoB. 171, (1887); Christ Bull. Acad. Geogr. Bot. XI. 206-207 with plate. Matthew, 378, (1911).

Polypodium moupinense Franch., 1887.
Goniophlebium moupinense Bedd., 1892.
(P. 385).
Polypodium drymoglossoides Bak. var. moupinense Christ, 1906.
Polypodium cyclophyllum Baker, Ann. Bot. 5. 473, 1891; New Ferns 90.

Rhizomes thread-like, wide-creeping; fronds distant, dimorphic, simple, nearly sessile, the sterile ones oblong, 2.5-3.7 cm. long, 1.2-1.6 cm. broad, the fertile ones linear-oblong, about 6 mm. broad, green and glabrous on both surfaces, moderately firm in texture, obtuse, narrowed to the base; midrib vanishing before reaches the tip of the frond; veins anastomosing in copious irregular areolas with free included veinlets; sori large, superficial, globose, close, uniserial, confined to the upper half of the frond.

Allied to Polypodium accedens Blume.

China: Kweichow, Yunnan, Szechwan, Chusan, Kiangsu, Anhwei, Shensi, Hupeh - Ichang; Chekiang-Ningpo; Hunan.

41. Polypodium oblongissorum C. Chr. Ind. 549 (1906); Matthew in Journ. Linn. Soc. 39; 381 (1911).

Polypodium subintegrum Baker, Kew Bull. (1893) 231 (non 1877).

Rhizome spigneous, wide-creeping, clothed with broad lanceolate blackish membranaceous clathrate dense scales; frond 1-2 cm. apart, narrowly linear, coriaceous, 25-40 cm. long, 3-8 mm. broad at the middle, gradually attenuate towards the base into a short stipe (2-4 cm. long), apex long-acuminate, green and glabrous above, the under sides sparsely covered with minute peltate brown deciduous scales, margin obscurely repandulous, narrowly revolute; veins obscurely immersed except costa, which is prominent particularly underneath; sori large, marginal, 1-2 cm. apart, subopposite or alternate, oblong, superficial, bullate, short oblong, 94 mm. long, prominently projecting beyond the margin of the frond when mature, in consequence of the free parts of the margin becoming revolute.

Yunnan.

A very remarkable plant, first discovered by A. Henry in Manmei, Yunnan, epiphytic on the tunk of forest trees, and easily distinguished by its relatively large bead-like sori

projecting well beyond the margin of long linear frond. From P. eilophyllum Diels to which the present species is closely allied, it differs by narrower, less revolute frond and the projecting marginal sori.

42. Polypodium lewisii Baker, JoB. 201, (1857); Matthew 380, (1911).

Rhizomes wide-creeping, firm, 3 mm. thick; scales lanceolate, acuminate, dark brown, with a paler edge, 2-3 mm. long; frond sessile, contiguous, but not crowded, linear-subulate, 4-10 cm. long, entire, glabrous, very rigid and coriaceous in texture, under 2 mm. broad, the edge recurved so as quite to hide the midrib; veins quite hidden; sori round, 1 mm. thick, placed on the upper half of the frond separated by intervening spaces, 6-15 on a side, close to the midrib, quite hidden by the recurved edges, so that the upper part of the frond is like a cylinder with round bead-like prominence.

Kansu, Kiukiang, Yunnan, Szechwan, Shensi.

This species is undoubtedly related to P. eilophyllum Diels but differs, particularly, by the margin of the frond being strongly revolute, so that it completely conceals the sori. It also recalls Vittaria lineata in texture and general habit, but its bead-like cylindrical appearance marks it very distinct at a first glance.

(P. 386.).

3.Polypodium eiloppyllum Diels in Engl. Jahrb. 29, 204, (1900); Matthew 378, (1911).

Polypodium involutum Baker, JoB. xxvii. 177, 1889; NPfl. 317.

Rhizomes short-creeping; basal paleae lanceolate, nearly black; fronds rigid, linear, contiguous, sessile, simple, to 30 cm. long, 3-5 mm. broad at the middle, tapering to both ends, bright green, rigid, with revolute edges; costa broad and distinct; veins quite hidden; sori oblong, confined to the upper half or third of the fronds, filling up the whole space between the midrib and involute margin.

Hupeh, Szechwan, Kweichow.

Allied to Polypodium lewisii Baker from Kiukiang, Kiangsi.

44. Polypodium subimmersum Baker, Kew. Bull. 55, (1895) Matthew 383, (1911).

Polypodium xiphropteris Baker, Kew Bull. 13, 1906; Matthew 384, 1911.
Polypodium mengtzeanum Baker, Kew Bull. 14, 1906.

Rhizomes short-creeping, basal paleae small, lanceolate, membraneous, black, clathrate; stipes very short; fronds subsessile, contiguous, linear, entire, glabrous, green, subcoriaceous, gradually attenuate towards base and apex, 30-45 cm. long, 10-12 mm. broad at the middle, veinlets immersedly hidden, anastomosing, sori subimmersed, oblong or globose, marginal or slightly intramarginal, remote, uniseriate.

Allied to Polypodium lineare var. loriforme Takeda, differs in slightly sinuate margin, with a sinus near each sorus.

Polypodium mengtzeanum Baker is form with broader fronds (to 2 cm. broad).

45. Polypodium asterolepis Baker, JoB. xxvii. 230, (1888); Takeda in Notes Bot. Gard. Edinb. xxxix. 283, (1915).

Polypodium macrosphaerum Baker, Kew Bull. 55, 1895; Matthew 380, 1911.
Polypodium aspidiolepis Baker, Ann. Bot. v. 474, 1891.
Polypodium intramarginale Baker, Kew Bull. 13, 1906.
Polypodium simplex var. aspidiolepis Christ, 1905.

Rhizome wide-creeping, calvate; stipes short, naked, 2.5-15 cm. long; fronds lanceolate, simple, subcoriaceous, green and naked above, pale green, clothed with scanty peltate brown membranaceous paleae on the under side, 30-45 cm. long, 2.5-3 cm. broad at the middle, primary veins slender, flexuo~~s~~use, dissolved intramarginally, intremediate veinlets copiously anastomosing, sori large, globose, near the margin, superficial, or slightly immersed, confined to above the middle of the frond; texture subcoriaceous or coriaceous.

Malesia, North Guinea, China: Szechwan, Yunnan, Kweichow.

Characterized by the rhizomatic scales, which are short, ovate, very obtuse, convex, entire and fusco-brown in color.

46. Polypodium annuifrons Makino, Bot. Mag. Tokyo 13, 48 (1899); Phan. et Pterid. Jap. Ic. i. t. 7. (1899).

Polypodium japonicum Makino, Bot. Mag. Tokyo 12, 165. 1898.
Polypodium schraderi Maxim. in litt, (non Mett.).

Rhizome creeping, attaining the length of several inches, stout-wiry, flexuos, often loosely branched, sending fibrous roots below, bears a few fronds above, scattered with small tubercles, the basal remains of the old stipes, and covered with adpressed minute scales which are ovate-deltoid, eroso-denticulate, dark-brown and often deciduous with age. Stipes loosely placed, articulate at the base, hard,

(P. 387).
naked, smooth, slender, terete, slightly compressed, stramineous, with 2 fibro-vascular bundles within, about 1-3 cm. long, the base clothed with scales which are narrowly deltoid, lacerate, fuscous-brown, and 1½-2 cm. long. Frond annual, lanceolate, sometimes falcate, about 9-23 cm. long, 1½-3cm. broad, gradually attenuate above into an obtusely or subacutely acuminate apex, acute at the base, and slightly decurrent to the stipes, entire, somewhat crisped, chartaceous, light green, paler beneath, naked but very thinly scaly on the lower portion of the midrib beneath, sparsely and very minutely nigro-punctate on the upper surface; midrib slender, prominent and stramineous above; venation immersed and superficially invisible, veins erect-patent, not distinct, in distance of about 4-6 mm. apart; veinlets forming irregularly small copious and obliquely angular-suboblong areolae, including a widely divaricately once or twice bifurcate free veinlets clavate at the end. Sori occupying the upper portion of the frond, in a single row midway between the midrib and margin or rather nearer the midrib, a little apart from one another, rounded, 1½-3 mm. across, very shallowly sunken, forming very low protuberances on the back, prominent, yellow, mixed with suborbicular, erosed and long-pedicellate peltate scales among long pedicellate sporangia.

Japan, China: Kweichow.

A medium-sized fern, epiphytic on the trunk of trees, may be a form of P. majoense C. Chr.

47. Polypodium sublineare Baker, Takeda in notes Bot. Gard. Edinb. XXXIX. 276, (1915).

Rhizome thick, covered by oblong-ovate very long-acuminate, clathrate ciliato-dentate paleae. Fronds subfasciculate, 12-45 cm. generally about 30 cm. long, 2-5 cm. often 3 cm. broad, lanceolate, apex long-acuminate, long decurrent towards base, texture subcoriaceous; veins inconspicuous, glabrous on either side; lamina copiously punctate with black dotes above, margin more or less repand, costa prominent sori mostly placed in the middle between costa and margin, round, globose 2-3 mm. in diameter, superficial, covered, when young, with peltate paleae.

Yunnan: Tongchwan Lin st., Mengtze, Tungchang.

Near Polypodium olgolepidum Baker but differs by fronds being subfasciculate and not distant, sessile and not stipitate, rhizomatic paleae long-acuminate, clathrate, ciliato-dentate, and not entire, dark-brown.

48. Polypodium lineare Thunb. Fl. Jap. 335, (1784); HKBI. 354 (excl. [illegible]); Christ 102; NPfl. 315; Matthew 380, (1911).

Pleopoltis thunbergiana Kaulf., 1827.
Polypodium wightianum Wall., 1829.
Pleopeltis elongata Kaufl, 1824.
Drynaria subspathulata Hooker, 1857.

Polypodium lineare Thunb. var. thunbergianum Takeda, 1915.

Rhizomes wide-creeping, woody, the scales lanceolate, dull-brown clathrate, cordate-ovate at base, long acuminate, margin ciliate-dentate; stipes varying from almost none to 2.5-5 cm. long; frond mostly subcaespitose or sparce, 10-30 cm. long (generally 15 cm.), broad, entire narrowed gradually to both ends; texture subcoriaceous; both sides nearly naked; margin usually revolute upon drying, areolae fine, with copious free veinlets; sori distinctly immersed, large, prominent, rounded or oval, close, often subconfluent when matured, forming a single row between the midrib and edge on the upper part of the frond, except the
(F. 388).
apex; when young covered with copious peltate scales.

Japan, Ceylon, Malayan Peninsula, Natal, Kaffraria, Angola, Korea, India, Hongkong, China: Shensi, Kansu, Hupeh, Szechwan, Kweichow, Kiangsi, Chekiang, Fukien, Anwhei, Yunnan, Hangchow, Hunan, Kiangsu; Kiukiang.

Var. contortum Christ, Nu. Giorn. Bot. Ital. n. s. 4. 98. t. i. f. 3, 1897.

Like the variety, but generally with more sparce fronds, which are of thinner texture, distinctly and shortly stipitate and become quite revolute and irregularly contort when dried up.

Var. subspathulatum Takeda in Notes Bot. Gard. Edinb. XXXIX. 270, (1915).

Drynaria subspathulata HK., Kew Journ. Bot. IX. 356, 1857.
Polypodium onoei Fr. et Szv., Enum. Pl. Japan. II. 264, 644, 1897.
Polypodium lineare Thunb. var. onoei Makino, 1899.
Polypodium lineare Thunb. var. abbreviatum Christ, 1902.

Fronds usually sparce, 2-7 cm. long, 2.5-5 mm. broad, subcoriaceous or coriaceous, apex rounded or narrowly obtuse, base very short and shortly attenuate into the stipes; margin always revolute. Sori confined to the apical part of the frond. Rhizomatic Paleae as in the type but generally shorter.

Japan, Hongkong, China: Chekiang, Kiangsu, Kweichow, Yunnan.

Var. ussuriense (Regl. et Maack.) C. Chr. Ind. 572, (1906).

Poeopeltis ussuriensis Regl., Act. Hort. Petr. VII. 663, 1881.
Polypodium leiopteris Makino, 1898.
Polypodium distans Makino, 1906.
Polypodium annuifrons var. distans Nakai, 1911.
Polypodium lineare var. coraiense Christ, 1908.
Polypodium coraiense Christ, l. c. 285, 1906.

Fronds mostly distant, rarely caespitose, generally distinctly stipitate (stipes 5-30 mm. long, rarely none), 7-20 cm. long with the stipe, 5-10 mm. broad, subcoriaceous, slender, gradually attenuated towards apex, acute, margin minutely revolute. Sori small (below 3 mm. in diameter), usually confined to the apical part or above the middle, approximate, but scarcely confluent. Rhizome slender, paleae ovate, acuminate, distinctly reticulated with slightly ciliate-denticulated margin.

Japan, Korea, China; Manchuria, Chihli, Anhwei- Wangshan.

Var. loriforme (Wall.) Takeda in Notes Bot. Gard. Edinb. XXXIX. 272, (1915).

Polypodium loriforme Wall., List n. 271, 1828; Mett. Bot. 92, 1857; Hooker in Gard. Ferns. sub. tab. 14, 1862.
Polypodium excavatum var. loriforme C. Chr. Ind. 541, 1906.

A luxuriant form. Fronds usually subaesptiose, 20- cm. long, sometimes over 30 cm. long, 2 cm. broad, coriaceous, narrowly lanceolate, long acuminate, very gradually short attenuate towards the base of stipes costa prominent and generally, when dried, longitudinally rugose. Sori very large, confined to the apical part of the frond or above the middle, distant, placed between the costa and margin or slightly nearer to the margin; the margin of the dried fronds rolls up as far as the line of the sori, so that the sori appear as if marginal. Rhizome thick, paleae ovate, very long accuminate, ciliate-dentate, black
(F. 389).
clathrate, dense and patent.

India, China: Yunnan, Szechwan.

Var. glaucosorum Christ, Bull. Geogr. Bot. Man. xi. 309, (1909); Matthew 380, (1911).

Large fern, sori large, whitish-atralous, on account of the presence of many diaphaneous peltate or imbrical scales enclosing the sproangia, fronds coriaceous, obtuse, not pointed.

Yunnan.

May be a form of P. excavatum.

40. Polypodium oligolepidum Baker. Gard. Chr. n. s. 14, 494, (1880); Takeda in Notes Bot. Gard. Edinb. 5. 276, (1915).

Polypodium lineare var. oligolepidum C. Chr., 1906.

Rhizomes creeping, thick, 2-3 mm. in diameter, fusco-black, paleae basal only, deltoid, narrowedly acuminate, entire, dense, small, lanceolate, brown-black, reticulate with broad hyaline margin; stipes under 2.5 cm. long, dark brown, nearly naked; fronds distant, simple, lanceolate, 10-23 cm. long, 1-2 cm. broad, apex narrowly acuminate narrowed gradually to the base, thick and coriaceous in texture, with small adpressed membraneous dark brown ovate cuspidate paleae scattered over the surfaces; venation hidden, sori large, globose, superficial, forming a row midway between costa and margin, on the upper half of the frond, 3-4 mm. in diameter.

Korea, Formosa, China: Yunnan, Canton - Lo Fou Shan; Shensi, Kansu, Hupeh, Szechwan, Kiangsi, Kweichow.

Characterized by the thick, almost black stipes, lanceolate fronds and large globose sori arranged in row between the midrib and the margin or slightly nearer the midrib.

50. Polypodium nudum (Hooker) Kze. Linn. 23, 281, (1850); Takeda, in Notes Bot. Gard. Edinb. 8: 277, (1915).

Pleppeltis nuda Hooker, Exot. Fl. 1 t. 63, (1823).
Drynaria nuda Fee, 1850-52.
Polypodium leopteris Kze., 1850.
Pleopteis sesquipedale Bedd., 1863.
Drynaria zelanica Fee, 1850-52.

Stipes varies from 5 mm. to 6 cm. long. The size of frond extremely variable, from about 10 cm. long and 7-10 mm. broad to 40 cm. long and over 15 mm. broad, linear, sometimes linear-lanceolate, often tapering into a narrowly acuminate apex; margin often revoluted, texture usually subcoriaceous and thinner than in Polypodium lineare, veins hidden. Sori usually large, in a regular row nearer to the costa than the margin, globose or suboblong, superficial or scarcely sunk.

Closely allied to P. lineare, but easily distinguished by the scales on the hiozme being ovate, acuminate, entire and brown in color, sori placed close to the midrib and usually reach more than half way down to the frond, while the rhizomatic scales in P. lineare aresubulate, long acuminate, ciliae-dentate and black in color; sori generally placed between midrib and the margin or slightly nearer the margin and extend but seldom to the base of the frond.

51. Polypodium trabeculatum Copel. Phil. Journ. Sci. Bot. 3. 283, (1908); Matthew 383, (1911).

(P. 390.).

Rhizomes creeping, 3 mm. thick, paleae dense black, peltate, apiculate, narrowly dentate, 2-3 mm. long; stipes 1-2.5 cm. long, stout, black or greenish upward; lamina 12-18 cm. long, scarcely more than 2 cm. broad upon drying, margin entire, vein almost towice as broad, margin crisp, narrowed gradually downward, acute; clad on both sufaces with black, minute,

peltate, orbicular or often caudate-ovate, numerous paleae texture fleshy-coriaceous; principal veins none, areolae with irregular included veinlets, all hidden; hypodermate hyaline none, deformed palisade-cells, trabeculato-incrassate sori in one row, near costa, globose, 4 mm. broad, scarcely immersed, surrounded by paleaceous paraphyses; color pale gray above.

Kwantung.

52. Polypodium udum Christ, Bull. Geogr. Bot. Man. 140, (1910); Matthew 383, (1911).

Rhizomes creeping, radicose, thick as raven's quill, covered with sparce short ovate conspicuously shorbid scalelets; leaves remote, stipes flexuous, 1 mm. thick, dark-green, 3-5 cm. long, clothed with ovate opaque acute minute scalelets; lamina smooth, opaque, ligulate, broadly lanceolate, acuminate or rather obtuse, gradually narrowed and decurrent towards stipes, 10-15 cm. long, to 2.5 cm. broad throughout, margin entire gut undulate, costa slender, but manifestedly squamulose, veins horizontal, 4 mm. far apart, fine, not extending to the margin, but bifurcated before reaching it, veinlets anastomosing in very fine irregular areolae, with included free veinlets; sori medial, uniseriate, solitary between lateral veins, rounded, 1 mm. broad, dark-brown, moderattely immersed; texture herbaceous, succulent, corrugated when dried, dark-green.

Kweichow, Yunnan.

53. Polypodium excavatum Bory; Willd. Sp. 5. 158, (1810) Matthew 378, (1911).

Polypodium simplex Sw., Schrad. Journ. 1800^2. 19, 1801.
Pleopeltis simplex Bedd., 1883.
Polypodium linear B/HK. HKBK. 354.
Polypodium scolopindrium Don. 1825.
Polypodium sesquipedale Wall., 1828; Mett. n. 162.
Polypodium bullatum Baker, 1876.
Polypodium lineare Thunb. f. major Christ, Bull. Geogr. Bot. Man. XVI. 105, 1906.
Polypodium maculosum Christ, l. c. non Christ 1898.

Rootstocks as thick as swan's quill, creeping, hypogaeous; stipes naked, erect, 7.5-10 cm. long, lamina simple, lanceolate, 30-45 cm. long, 3.7-4.3 cm. broad at the middle, tapering gradually to the base and apex, moderately firm in texture, green and glabrous on both surfaces, with a few scattered brown membranous peltate scales, veins anastomosing copiously; sori large, rounded, immersed forming a single row near the margin in the upper half of the frond.

Japan, Himalayas, Mascar Islands, China: Kweichow, Kiukiang, Hupeh, Szechwan - Omei Shan.

Charaterized by very thin herbaceous texture of the frond, distinctly showing the veins and veinlets; the sori arranged in arow quite close to the midrib and immersed and the rhizomatic scales ovate, acuminate and entire. The sorus, when young, completely covered with a numerber of large peltate scales, which are usually brown.

(P. 391).

Closely allied to P. nudum, differs by its very thin frond. which does not roll up on the margin and by its sori, which are situated nearer the midrib, often larger and obliquely oval in shape, while those of P. nudum are strictly round.

54. Polypodium rhynchophyllum Hooker, Ic. Pl. t. 954, (1854); HKBK. 359; NPfl. 316.

Pleopeltis rhynchophylla Moore, 1857.
Phymatopsis rhynchophylla J. Sm., 1875.

Rhizome firm, wide-creeping, with copious fibrillose, bright ferruginous scales; fronds dimorphous, the sterile ones ovate, 2.5-3.7 cm. long, with about the same length, fertile ones 7.5-15 cm. long, 1.2-1.8 cm. broad, narrowed very gradually upward, the edge obscurely toothed, the stipes 5-10 cm. long; of coriaceous texture; both sides naked; main veins distinct to the edge, with copious fine areolae between them with free included veinlets; sori uniseriate, confined to the upper half of the fertilef fronds.

N. India, Hongkong, China: Hainan, Swata, Kansu, Kwantung, Szechwan, Hupeh.

Closely allied to P. drymoglossoides Baker, differs by sharply prominent veins and long broad reddish-brown rhizomatic scales. It is rather nearer P. griffithianum Hook. than P. drymoglossoides.

55. Polypodium griffithianum Hooker, Ic. Pl. t. 951, (1854); HKBK. 359; NPfl. 316; Matthew 379, (1911).

Pleopeltis griffithiana Moore, 1857.
Phymatopsis griffithiana J. Sm., 1875.
Polypodium majoense C. Chr., Lev. Cat. pt. Yunnan 108, 1916.

Rhizome wide-creeping, the scales dense, linear, squarrose, dull-brown; stipes distant, 7.5-15 cm. long, firm, erect; fronds 15-20 cm. long, 3.7-5 cm. broad, the point acute, the edge repand, the base rounded or rather narrowed or auricled; texture coriaceous; main veins very distinct to the edge; areolae fine, hidden, with copious free veinlets; sori large, 1 between each main vein in a row near the midrib.

N. India, Borneo, China: Szechwan, Hupeh, Yunnan, Hunan.

Very closely allied to the simple form of P. hastatum, but can always be distinguished by its much thicker, oblong-elliptical fronds and by its larger costal sori.

56. Polypodium hemitomum Hance, JoB. 269, (1883); Matthew 379, (1911).

Polypodium ovatum Wall.; Hk. et Grev., Ic. Fil. t. 41, 1827.
Polypodium phyllomanes Christ, 1902.
Polypodium phyllomanes var. hemitomum Christ, 1902.
Polypodium deltoideum Baker, Journ. Bot. XXVI, 230 1888.
Polypodium rosthornii Diels, Engl. Jahrb. 29, 205, 1900.

Rootstock wide-creeping; stipes naked, erect, 23-30 cm. long, winged toward the top; lamina simple, triangular-lanceolate to deltoid, 20-23 cm. long, and broad, moderately firmin texture, green and glabrous, both surfaces, deeply pinnatifid in the lower half into 5-6 proximate lanceolate lobes under the entire terminal~~o~~ one, the two basal ones much the largest, ovate-acuminate, 5-7.5 cm. long, margin undulate; main veins produced from the midrib to the edge, 6-8 mm. apart; intervening veinlets anastomosing copiously; sori large, globose, superficial, mainly in regular lax rows on each side of the main veins.

Szechwan, Hupeh - Ichang; Kwantung Lienchow; Yunnan.

(P. 392).
57. Polypodium ensatum Thunb. Tr. Linn. Soc. 2. 341, (1794); Mett. n. 225; HKBK. 361; NPfl. 315; Matthew Matthew 378, (1911).

Polypodium phyllitidis Thunb., Fl. Jap. 335, 1784 (non L. 1753).
Pleopletis ensata Moore, 1862.

Rhizomes firm, wide-creeping, the scales lanceolate, spreading, dull-brown; stipes 15-30 cm. long, erect, scaly below, fronds 15-30 cm. long, 3.7-7.5 cm. broad, narrowed to both ends, texture herbaceo-coriaceous, both sides naked; main veins distinct nearly to the edge, the areolae fine, close, copious and free veinlets abundant; sori irregularly unserial between the main veins few, but often confluent.

Japan, Tsus-sima, China: Kweichow, Omei Shan, Hupeh, Chekiang, Yunnan, Anhwei.

Very closely allied to Polypodium ovatum Wall, which has, however, broad base of the frond and the more commonly multiseriate sori. The sori in the present species are sometimes uniseriate, but with the result that they become more or less irregular~~g~~ly distributed--- Takeda.

Easily distinguished from P. ovatum Wall. by narrowly lanceolate frond of more thin texture, not abruptly but very

gradually narrowed from the base downward.

58. Polypodium clathratum Clarke, Tr. Linn. Soc. II. Bot. 1. 559 t. 82 f. 1. (1880); Matthew 377, (1911).

Pleopeltis clathrata Bedd., 1883.
Polypodium soulieanum Christ, Bull. Soc. Fr. 52 Mem. 1. 15. 1905.

Rhizomes short-creeping, with ovate acute, often hair-pointed distinctly clathrate scales; fronds small, stipes often as long as the frond; sori mixed with sessile /irregularly peltate and lacerate clathrate scales.

N. India, Loochoo, Japan, Himalaya, China: Kweichow, Turkestan, Kansu, Chihli.

Most closely related to P. lineare, but the rhizomatic scales are peculiar , the veins a rich black-chestnut colour, the texture much thiner the venation in the young healthy fronds much more conspicuous and the stipes usually longer.

59. Polypodium normal Don. Prod. Fl. Nepal. 1. (1825); Mett. N. 151; Farngatt. Polypo. 86. t. 1. f. 41-43; HKBK. 358; Christ 104; NPfl. 315; Matthew 381, (1911).

Phymatodes normale Presl., 1836.
Drynaria normale J. Sm., 1841.
Polypodium longifrons Wall., 1828; HK. et Grev. Ic. Fil. t. 65.
Pleopeltis longifrons Moore, 1862.

Rhizomes woody, scandent, not very thick clothed with deciduous black fibrillose ovate or lanceolate, sometime almost hair-pointed adpressed scales, some of which bear on their back atufted of long reddish-brown bristles; stipes 2.5-7.5 cm. long, or almost sessile, stramineous; fronds 25-60 cm. long, 2.5-5 cm. broad, entire, narrowed gradually to both ends; texture herbaceous; both sides naked; no distinct main veins, but the fine veinlets slightly raised, forming copious irregular areolae with free including veinlets; sori large, prominent, not immersed, often in several rows or irregularly in one row or rarely in a row not far from the midrib.

N. India, Malayan Peninsula, Natal, Japan, Caffraria, Formosa, Hongkong, China: Szechwan, Kweichow, Kiangsi, Yunnan, Hupeh, Fukien.

This species has often been confounded with P. fortunei and its other congeners from which differs, however, by its very peculiar rhizomatic scales, which bear on their back a tuft of long reddish-brown bristles, usually much narrower and thinner texture and smaller, usually polyseriate sori. An epiphytic fern on the trunks of trees with slender rhizome.

Var. polysorum Baker, Jon. 202, (187~~4~~5).

Rhizomes wide-creeping, flexuose, 2 lines thick, naked; stipes none, or extremely short; lamina oblanceolate, 7.5-13 cm. long, 2.5 cm. broad, cuneate at~~h~~ the base, glabrous, subcoriaceous; when the frond is held against the light; sori placed in crowded erecto-patent rows of ~~b~~ about four each, extending regularly from near the midrib to the edge, except in the lower half or quarter of the frond which are sterile.

Kiangsi Kiukiang.

60. Polypodium fortunei (Moore) Lowe, Ferns 1. t. 42 B. (1857); Takeda in Notes Bot. Gard. Edinb. 8. 285, (1915).

Drynaria fortunei Moore, Gard. Chr. 708, 1855.
Polypodium chinense Mett.; Kuhn. 1868; C. Chr. Ind. 516.
Polypodium henryi Christ, 1898.
Polypodium austrosinicum Christ, C. Chr. Ind. 512, 1906.
Polypodium normale var. madagascariensis Bak., 1788.

Rhizome thick, creeping, slender, covered with ovate, obtuse, entire fuscous-brown scales with fronds lateral and articulated at an interval of 1 cm. or so; fronds simple, linear, lanceolate, strap-shaped, gradually attenuated towards both ends, the apex acuminate; texture thin chartaceo-subcoriaceous, margin slight wavy or undulated and somewhat recurved, entire or subsinuate, surfaces smooth, punctate with small transparent dots, about 30-50 cm. long, bright green, but light green or dark when dry sori strictly round, prominent, 2-3 mm. across uniserial near the costa or irregularly biseriate and formed on the upper part of the frond, or often reaching more than half way down or even to the base of frond, lateral veins and veinlets prominent, anastomosing copiously; the transparent dots in the frond indicate the thickened apices of the short free veinlets, which branched out from the side of the series of net-work meshes in which the large veins are united.

S. Africa, Madgascar, Formosa, China; Fukien, Chekiang, Hupeh, Szechwan, Yunnan, Kwangsi, Kiangsi, Poo-too Islands.

The present species, when stunted, is not easy to distinguish from P. nudum, but its visible veins and veinlets in the dried specimen and its strictly round sori can always serve as distinct characters from the latter, in which the veins and veinlets are hidden and the rhizomatic scales more pointed.

61. Polypodium oligolepis Baker, Kew Bull., 231, (1898).

Rhizomes epigaeous, creeping, 4 mm. in diameter clothed with lanceolate, sorbid brown paleas; petiole subnaked, slender, 10-15 cm. long; lamina lanceolate, entire, 23-25 cm. long, 2.8-4.2 cm. broad below the middle, gradually attenuate towards the apex, decurrent at the base along the stipes, moderately firm, green, glabrous above, paleaceous near the costa below, lateral veins distinct to the margin, almost parallel, the intermediate veinlets anastomosing into copious areolae; sori globose, superficial, 2 mm. in diameter, uniseriate near the costa.

(P. 394.).

Allied to Polypodium hemionitidum Wall. differs by uniseriate sori being placed near the both sides of the costa between the primary parallel veins.

62. Polypodium engleri Luerss. in Engl. Jahrb. 4, 363, (1883).

Polypodium hastatum var. engleri Christ, Bull. Boiss. vi. 875, 1898; Matthew 379, (1911).

A simple form of P. hastatum, very much elongated, stipes 13 cm. long; leaves 20 cm. long, 2 cm. broad, having as many as 30 lateral veins on each side of the costa. "This is distinguished from Polypodium hastatum chiefly by its stipes usually shorter than the frond, which does not taper gradually towards the apex and then abruptly narrows in acuminate or even subcuspidate manner, while that of Polypodium hastatum (in the simple form) gradually narrows towards the apex. In some specimens of Polypodium engleri, frond is even slightly broader towards the apex than at the base." --- Takeda.

Formosa, Korea, China: Yunnan, Kweichow, Szechwan, Fukien.

Easily distinguished from P. hastatum by long tapering linear frond (-25 cm. below 2 cm. broad), which does not broadened but slightly narrowed towards base and is broadest in the middle with strongly repand margin. P. hastatum Thunb. in simple forms has much shorter (usually under 10 cm.) frond, which has a much broadened, usually rounded base and gradually narrowed towards apex; stipes usually much longer than frond.

A fairly common fern in Yunnan, Szechwan.

63. Polypodium hastatum Thunb. Fl. Jap. 335, (1784); Sett. n. 201; HKSK. 361; Christ 109; NPfl. 318; Matthew 379, (1911); Makino in Phan. et Pter. Japon. Icon. Illus. t. 88.

Polypodium trifidum Don., 1825; HK. 363; NPfl. 318. (non Hoffm. 1790 nec Smith. 1796).
Pleopeltis trifidum Bedd., 1870.
Phymatodes trifidum J. Sm., 1875.
Polypodium arenarium Baker, 1895.

Polypodium chenopus Christ, 1905.
Drynaria hastata Fee, 1850-52.
Pleopeltis oxylobum Bedd., 1863.

Rhizome firm, the scales linear spreading, bright ferrugnous; stipes 5-10 cm. long, erect, glossy; frond 10-15 cm. long, simple, lanceolate, 1.2-3.7 cm. broad, or 3-lobed, with the lateral lobes like the terminal one but smaller; texture coriaceous; both sides naked; main veins distinct to the edge, parallel with copious fine areolae between them with free included veinlets; sori in a single row, nearer the midrib than the edge.

Himalaya, Ceylon, Philippines, Japan, Korea, Formosa, Hongkong, China: Shensi, Kansu, Shangtung, Szechwan, Kweichow Kwantung, Yunnan, Anhwei, Kiangsu.

An extraordinary polymorphic species, but characterized by the margin of fronds being constantly depressedly crenate with rather distant notches, the sori situated midway between the midrib and margin, or slightly nearer the midrib and by the densely echinate spores.

Var. simplex Christ, Bull. Geogr. Bot. Man. xvi. 105, (1906).

A simple form with undivided fron and strongly undulate margin.

India, China: Szechwan, Yunnan, Thibet, Chekiang.

Var. dolichopodum Diels.

Polypodium dolichopodium Diels, Engl. Jahrb. 29, 205, (1900).
Polypodium chenopus Christ, Bull. Soc. Bot. Fr. 52. Mem. I. 20, (1905).

Stipes longer than lamina; lamina consists of 3 (rarely 5 as in Polypodium chenopus) long erect-ascending segments, Oale-glaucous beneath, the edge thickened, undulate and often without the characteriste remote notches as in the type.

Szechwan.

Var. dactylinum Christ.

Polypodium dactylium Christ, Bull. Soc. Fr. 52. Mem. 1. 20, (1911).

Lamina Palmato-pedate with 5-7 erect segments, otherwise like the proceeding one.

Szechwan.

Var. catadronum (Christ).

Polypodium trifidum Don var. catadronum Christ., Not. Syst. 1. 33, (1909).

Fronds 12 cm. long, gradually and broadly decurrent; the costal wing broad, segments almost pedately disposed.

West China.

f. pygmaea Maxim. Fl. Asi. Or. Fragm. 73, (1879); Matthew 379, (1911).

Polypodium matthewii Tutcher, Journ. Linn. Soc. 37, 68, 1905.

Fronds ovate, or elliptical, entire, obtuse, 8-16 mm. long, 6-8 mm. broad; sori 2-3 between costa and margin, nearer to the costa.

Shantung, Manchuria.

An extremely dwarf form of the type.

64. Polypodium hemionitideum Wall. List n. 284, (1828); Mett. n. 215; HkBk. 360; Christ 105; NPfl. 315; Matthew 379, (1911).

Selliguea hemionitida Presl., 1836.
Drynaria hemionitidea J. Sm., 1841.
Colysis hemionitida Presl., 1849, Epim. 147.

Rhizomes woody, hypogaeous; stipe 2.5-15 cm. long, firm, erect; frond 23-45 cm. long, 5-7 cm. broad, narrowed to both ends, the edge entire; texture subcoriaceous; both sides naked; veins very distinct, the main ones branching and becoming lost before they quite reach the edge, including irregular rather large areolae with a few free veinlets; sori in a very irregular row between each main vein often confluent.

Australia, N. India, Formosa, Hongkong, Neighbor ies, China: Hainan, Kwangtung.

65. Polypodium hymenodes Kze. Linn. 23, 279, 319, (1850); Mett. Fil. Hort. Lips. 37 t. 25 f. 40-41, (1856); Takeda in Notes Bot. Gard. Edinb. 8. 267, (1915).

Polypodium subhemionitideum Christ. Bull. Boiss. 7. 5, 1899.

Resembling Polypodium normale in having a thin oblanceolate frond, which is acuminate at the apex and towards the base gradually decurrent into a very short stipe and in having the sori irregularly scattered over the greater part of the under surface of the frond, but differs by the nature

of the scales on the rhizome, which are ovate-lanceolate, long-acuminate, ciliate-denticulate on the margin, and bears no bristles on the back --- Takeda.

(P. 396).

Also near Polypodium hemionitideum Wall. to which it is similar in habit and venation, but differs in dicidedly narrower fronds with sinuate margin; the veinlets in the areolae with clavate apices, (not in a fine tip), and in irregular multi-seriate sori on the upper part and much more sparce on the lower with the first row almost touching the costa --- Christ.

North India, Formosa, North Guinea, China: Yunnan, Kweichow, Szechwan, Hunan.

Var. marginal Takeda, Notes Bot. Gard. Edinb. 8. 288 (1915).

Differs from the type in having sori distributed near the margin, leaving a blank space along the midrib.

Yunnan.

Var. anomalum (Christ) Takeda

Polypodium anomalum Christ, 1898.

A monstrous variety with lobed fronds known from Luzon.

66. Polypodium hainanense C. Chr. Ind. 531, (1906); Matthew 379, (1911).

Polypodium dimorphum Baker, Ann. Bot. 5. 477, (1891); New Ferns. 94, (non Link 1833).

Rhizomes stout, woody, short-creeping, Fronds dimorphic; the sterile many, with slightly paleaceous stipes, 5-7.5 cm. long, and simple oblong-lanceolate acuminate blade 7.5-10 cm. long, 3.8-4.2 cm. broad at the middle, narrowed to the base; the fertile with a stipe 15-20 cm. long and a lanceolate blade under 2.5 mm. broad, main veins of sterile frond erecto-patent, flexuose, 8 mm. apart, not quite reaching the edge. Sori irregularly 2-3-seriate between the main veins, large, globose or two confluent in an oblong mass.

Formosa, China: Hainan, Kwantung.

Near Polypodium triquetrum.

67. Polypodium subhastatum Baker, Jour. XXVII. 177, (1889); Matthew 378, (1911).

Polypodium hecuraceum Christ, Bull. Geogr. Bot. Man. (1902), 215, c. f.; Matthew 378, (1911).

Rhizomes slender, creeping to the length of foot or more, paleae small, lanceolate, membranaceous, bright brown; stipes very short, Fronds simple, ovate or deltoid, hastate or truncate at the base, acute, 2.5-5 cm. long, moderately firm in texture, green and glabrous on both sides, decurrent in a narrow wing halfway down the stipe; veins anastomosing copiously in irregular hexagonal areolae with free included veinlets; sori globose, superficial, irregularly scattered sometimes over the whole under-surface of the frond.

Japan, China: Szechwan, Kweichow, Hupeh.

Closely allied to Polypodium buergerianum, differs chiefly by the frond which is much thinner and abruptly narrows into a long, broadly-winged stipe and also shows a tendency to become repand or more or less pinnatifid on the margin.

68. Polypodium punctatum (L.) Sw. Schrad. Journ. 1800^{2}. 21, (1801); Christ 106; Matthew 382, (1911).

Achrostichum punctatum L., Sp. ed. II. 2. 1524. 1763.
Drynaria punctata J. Sm., 1841.
Polypodium iriodes Lam., 1804; HKBK. 360; BFl. 315.
Pleopeltis iriodes Moore, 1857.

Rhizomes stout, the scales dark-brown, ovate, obtuse; frond sessile or subsessile, 30-90 cm. long, 2.5-7.5 cm. broad narrowed gradual
(P. 397).
ly to both ends, the edge entire; texture subcoriaceous; both sides naked; both sides naked; venation immersed, but visible in dried specimens, main veins fine but distinct to edge, connected by cross veinlets large than the other with copious fine areolae in the interspaces, including free veinlets; sori very small, and copious, scattered irregularly, generally only on the upper half of the frond.

Africa, Chusan, Polynesia, N. India, to Japan, Isle of Pine and N. S. Wales, Natal, Angola, Guinea Coast, Formosa, China: Kweichow, Szechwan, Chekiang, Yunnan, Fukien.

69. Polypodium membranaceum Don. Prod. Fl. Nepal. 2. (1825); Mett. n. 232; HKBK. 360; Christ 105.

Pleopeltis membranacea Moore, 1830.
Drynaria undulata J. Sm., 1841.
Polypodium grandifolium Wall., 1828.

Rhizomes stout, the scales ovate, spreading, membranous, lucid-green; stipes 2.5-10 cm. long, firm, erect; fronds 30-90 cm. long, 5-15 cm. broad, membranous; main veins distinct, with very copious fine areolae with free veinlets between them; sori mostly in two rather irregular rows near the main veins.

N. India, /Ceylon, Philippines, China: Yunnan, Kweichow, Szechwan.

70. Polypodium buergerianum Miq. Ann. Lugd. Bat. 3. 170, (1887), Matthew 377, (1911).

Polypodium ningpoense Baker, 1891, Gard. Chr. (1880). XIV. 494.
Polypodium brachylepis Baker, 1880.

Rhizomes as thick as a goose's quill; paleae brown, deltoid, adpressed; stipes naked, stramineous, stiffly erect 7.5-10 cm. long; fronds lanceolate, simple, green, glabrous, almost membraneous in texture, under 30 cm. long, 2-3.7 cm. broad in the middle, acuminate, narrowed gradually to the base; main veins fine, erecto-patent, distinct andparallel, nearly to the edge, 6-8 mm. apart, enclosing copious minute areolae with free included veinlets; sori copious, minute, scattered, terminal on the free veinlets.

Formosa, Japan, China: Szechwan, Fukien, Kiangsi - Kuling.

71. Polypodium zippelii Bl. Fl. Jav. Fil. 162 t. 80, (1829); Mett. n. 224.

Pleopeltis zippelii Moore, 1872, Bedd. Ferns Br. Ind. 357.
Polypodium heterocarpum Bl., HKBK. 370.

Rhizomes slender, shortly creeping, scales lanceolate, acute; fronds lanceolate, often quite caudate at the apex, narrowed gradually at the base into a short stipe (or more rarely with a stipe about 5 cm. long), subcoriaceous, margin entire, or a little scales; primary veins prominent and near the margin, areolae copious, with free included simple or forked veinlets; sori compital in two t/rows between the primary veins and is about four rows between the costa and margin.

Himalaya, Java, Philippines, China: Hainan.

72. Polypodium longissimum Blume, Enum. 127, (1828); Fl. Jav. Fil. 159 t. 66; Mett. n. 141; HKBK. 366; Christ 112; Matthew 380, (1911).

Phymatodes longissimum J. Sm., 1857.
Pleopeltis longissimum Moore, 1857.
Colysis longissimum J. Sm., 1875.

Rhizome wide-creeping, the scales large, ovate, brown, adpressed; stipes 30-45 cm. long, firm, glossy; fronds 1/3-1.33 m. long, 15-30 cm. broad, cut down very nearly to the rachis into numerous erecto-patent acuminate linear subentire lobes ~~Xp~~10-20 cm. long, 6-12 mm.
(P. 398).
broad, texture coriaceous, both sides naked, veins forming

large distinct costular areolae and beyond them smaller irregular ones, both with free veinlets; sori in close single rows near the midrib, forming distinct papillae on the upper surface.

Philippines, N. India, Polynesia, Formosa, Hongkong, Loochoo, China: Kwantung, Hainan.

73. Polypodium phymatodes L. 306, (1771); HKBK. 364; Christ 110; NPfl. 318; Matthew 382, (1911).

Chrysopteris phymatodes Link, 1841.
Drynaria phymatodes Fée, 1850-52.
Phymatodes vulgaris Presl., 1836.
Polypodium gossum Langsd. et Fisch, 1810.

Rhizome wide-creeping, woody, the scales dark-brown, fibrillose; stipes 7.5-30 cm. long, firm, erect, glossy; frond varying from simple, oblong-lanceolate, to 60-90 cm. long, 30 cm. broad, cut down to a broadly winged rachis into numerous entire acuminate lanceolate-oblong lobes 10-20 cm. long, 2.5-3.7 cm. broad; texture coriaceous; both sides naked; no distinct main veins; areolae fine with copious free veinlets; sori large, more or less immersed, 1-2 serial or scattered.

N. Australia, Natal, Angola, Guinea Coast, Malayan Isles, Tsussima, Malesia, Polynesia, China: Hainan, Yunnan.

74. Polypodium trisectum Baker, Kew Bull. 232, (1898); Matthew 383, (1911).

Rhizomes epigaeous, creeping, slender, clothed with small linear appressed sorbid-brown paleae; stipes slender, naked, 10-13 cm. long; lamina deltoid, trisect, or pedate, 25-30 cm. long, membranaceous green and shortly glandular hairy on both ~~ph~~ sides, terminal lobes lanceolate, simple or sometimes tending to produce additional lobes, thus the frond becoming subpinnatifid, margin thickened and shallowly notched, 3.5-4.2 cm. broad, gradually attenuate towards the apex, the lateral lobes much shorter, erecto-patent; primary veins parallel, erecto-patent, almost extending to the margin; the intermediate veinlets anastomosing copiously into areolae, with free included veinlets; sori globose, superficial, contiguous to the costa, uniseriate along the both sides of the costa, solitary between primary veins.

Yunnan, Kweichow.

Well characterized by the presence of the short glandular hairs on both surfaces, which are longer and more conspicuous than those in P. pteropus Bl.

75. Polypodium malacodon Hooker, Sp. 5. 87, (1863); HKBK. 365; NPfl. 319; Matthew 380, (1911).

Pleopeltis malacodon Bedd., 1883 (non 1876~~0~~).
Polypodium austrosinicum Christ, Bull. Geogr. Bot. Man. 107, 1906.
Polypodium albidoglaucum C. Chr., Ind. Suppl. 58, 1913.

Rhizomes rather slender, the scales lanceolate-acuminate, brown or nearly black; stipes 10-15 cm. long, slender, glossy; fronds 15-37 cm. long, 12-15 cm. broad with a linear or linear-oblong subentire or repand and finely toothed acuminate terminal lobes 7.5-10 cm. long, 1.2-1.8 cm. broad and 1-4 smaller lateral ones on each side, which are more or less confluent at the base; texture papyraceous or subcoriaceous; both sides naked; main veins fine but distinct, the areolae fine and clearly visible with copious free veinlets; sori in a single row on each side, nearer the midrib than the edge.

(F. 599).
N. India, China: Hupeh, Szechwan, Yunnan, Szechwan.

76. Polypodium ebenipes Hooker, Sp. 5. 88, (1863); FKBM. 365; Matthew 378, (1911).

Pleopeltis ebenipes Bedd., 1866.
Phymatopsis ebenipes J. Sm., 1875.
Polypodium melanopus R. Br., Wall. 1829 (nomen).

Rhizomes stout, wide-creeping, the scales large, lanceolate, glossy, nearly black, stipes 15-23 cm. long, naked, glossy; fronds 15-45 cm. long, 20-30 cm. broad, cut down to a broadly-winged rachis into nearly entire acuminate lobes 10-15 cm. long, 10 mm. broad, the lowest pair deflexed; main veins distinct to the edge; areolae fine, with copious free veinlets; sori in single rows near the midrib.

Borneo, N. India, China: Yunnan.

The pinnatifid form of the present species often resembles P. oxylobum and the others of the group, differs from its all relatives by the patent, regularly arranged pinnae, the margin of which is serrate with low teeth and the very black, shining rhizomatic scales.

77. Polypodium stewartii (Bedd.) Clarke, Tr. Linn. Soc. II. Bot. I. 565, (1880); FKBM. 515.

Pleopeltis stewartii Bedd., Ferns, Brit. Ind. t. 204, (1866).
Polypodium malacodon var. stewartii Christ, Bull. Soc. Fr. LII. Mem. I. 18, (1905); Matthew 380, (1911).

Rhizome rather slender, creeping somewhat extensively; scales lax, soft, lanceolate-linear, almost hair-pointed, yellow-brown; stipes and main rachis glabrous beneath; lowest pinnae deflexed, somewhat broader at the base; margin minutely serrulate, teeth not mucronate.

Hupeh, Szechwan-Omei Shan; Tibet.

Most closely allied to P. malacodon, but differs by firmer black rhizomatic scales, by rachis being furnished with a few loose spreading scales near the base of the more elongated and tapering lamina and above all by the nature of its serration which is not cuspidate-pointed as in its relative and by the direction of its lowest pinnae which are deflexed, while those in P. malacodon are in-variably falcate and curved towards the apex of the frond or erect patent at most. From P. cyrtolobum the present species differs by its glabrousness, rhizomatic scales and, particularly, by its divaricate lobes spreading straight stellately in every direction, whereas in P. cyrtolobum the lobes are curved, all much bending upwards.

78. Polypodium crenato-pinnatum Clarke, Journ. Linn. Soc. 25. 99 t. 42, (1888); Matthew 377, (1911).

Pleopeltis crenato-pinnata Bedd., Ferns Brit. Ind. Suppl. 96, 1892.
Polypodium griseo-nigrum Baker, Kew Bull. 55, 1895; Matthew 379, 1911.
Polypodium pseudo-serratum Christ, Bull. Boiss. 6. 871, 1898.

Rhizomes slender, creeping, densely clad in small, lanceolate, fuscous brown deciduous, scales; stipes 7.5-15 cm. long, slender, almost naked; fronds elongato-triangular, 7.5-15 cm. long, pinnatifid or almost pinnate to the rachis, glabrous; segments lanceolate, broadly adnate, with wavy crenations or some of the lower ones irregularly pinnatifid; lateral veins more or less distinct nearly to the edge, undulato-subparallel, areolae with free veinlets inconspicuous except when held up to the light; sori placed solitary between lateral veins, medial or slightly nearer to the costa.

(F. 400).
[illegible] N. India, China: Yunnan, Szechwan - Omei Shan.

Very near to P. veitchii, differs by its larger size, usually acuminate pinnae which frequently show a tendency to become pinnatifid and are hardly deflexed; while the frond in P. veitchii is much smaller with fewer pinnae, which are, except one or two near the apex, always very obtuse, and those of the basal pairs are often deflexed.

79. Polypodium cyrtolobium Clarke, Tr. Linn. Soc. II. Bot. 1. 563 t. 83, (1880).

Rhizome rather slender, creeping somewhat extensively, often glaucous; scales peltately adfixed, with a scarious brown margin and ~~pointed~~ prolonged lanceolate spreadinb black point; stipe long, glabrous, base of the main rhachis beneath often with a few soft scales; frond 15-37 cm. lanceolate, narrowed into the stipe, the pinnae all much drawn upwards, so that the frond is narrow, the last lobe exceedingly long; margin minutely serrate, the teeth not mucronate.

N. India, China: Yunnan.

A very uniform species, pendent from trees, whence the fronds have a peculiarly papering appearance.

Its nearest ally is P. malacodon, from which it differs by comparatively short stipes, a large graceful frond with long falcate pinnae, the margin of which is denticulate with low and not cuspidate teeth.

80. Polypodium trifidum Don, Prod. Fl. Nepal. 3. 1825; HBBI. 378; NFFl. 318; Hand.-Mzt. Symb. Sinic. VI. 44, (1929).

Polypodium oxylobum Wall., List n. 284, (1825) (nomen); HK. Sp. 5. 77; Mett. Pol. n. 202, (1857); Takeda in Notes Bot. Gard. Edinb. 8. 299, (1915).
Phymatodes oxylobum Presl., 1836.
Pleopeltis oxyloba Bedd., 1863.
Pleopeltis trifida Bedd., 1870.
Polypodium hastatum var. oxylobum Clarke, Tr. Linn. Soc. II. Bot. 1. 563.
Polypodium podobasis Christ, Bull. Geogr. Bot. Mans. 215. 1909.

Rhizome stout, the scales linear, squarrose, bright-ferruginous; stipes 7.5-15 cm. long, firm, erect, glossy; frond 15-30 cm. long, 15-20 cm. broad, with a large linear terminal lobe and 1-3 similar ones on each side, which reach down within 6 mm. of the rachis and are 10-15 cm. long, 1.2-2.2 cm. broad, narrowed to the point, the edge entire or obscurely repand; texture coriaceous; both sides naked; main veins distinct to the edge, with transverse veinlets and copious fine areolae between them; sori uniserial and one only between each main vein.

N. India, Formosa, China: Kwantung, Yunnan, Hupeh, Szechwan.

This species has particularly been confounded with P. hastatum Thunb. But can easily be distinguished by its absolutely entire margin of the frond and by its larger size of the rhizomatic scales. It is true that the present spe-

cies varies in fronds from ternate to pinnatifid or even be simple, but nevertheless, in the lobed frond, it is always pinnatifid, whereas P. hastatum never produced pinnatifid fronds, but invariably pedate. However, both species may become trifid in certain cases, which probably has been the cause of confusion.

Var. catadromum (Christ) C. Chr. Medd. Göteb. Bot. Tradg. 1. 103, (1924).

(I. 461).

Polypodium trifidum Don var. catadromum Christ, Bot. Syst. 1: 33, 1909.

Smaller. Frond 12 cm. long, gradually and broadly decurrent; costal wing broad; segments almost pedatedly arranged.

Szechwan.

81. Polypodium coronans Wall. List n. 286, (1828); Mett. Pol. 121, n. 242 t. 3 f. 40, 41, (1857); Christ 117; M.fl. 319.

Polypodium conjugatum Baker, 1868, HKBK. 366.
Phymatodes coronans Presl., 1836.
Drynaria coronans Bedd., 1870.

Rhizome stout, thick, fleshy, elongated, densely matted with long linear crisped bright-brown scales. Fronds densely tufted, arranged in a circle, sessile, 60-90 cm. high or more, stiffy coriaceous in texture, glabrous and shining, deeply pinnatifid or almost pinnate, lobes numerous the longer ones lanceolate, acuminate, from 7.5 or 10 cm. to twice that length, divided almost to the rachis in the center of the frond, becoming gradually shorter and more obtuse below the middle until stipes again expands into a cordate base often 15-20 cm. broad, with short rounded lobes; veins prominent, parallel, starting from the midrib and distinct to the edge, connected by transverse reticulations, sori in 1 row between each two primary veins. Texture rigid, both sides naked.

Hongkong, Formosa, Malacca, East India, Hongkong, China: Kwantung, Kweichow, Kwangsi, Hainan.

82. Polypodium pteropus Blume, Enum. Addend. (1828); Fl. Jav. Fil. 166 t. 75, (1829); HKBK. 362; Christ 109; M.fl. 318; Matthew 382, (1911).

Polypodium tridactylon Wall., 1828; HK. et Grev. t. 209; Benth. Fl. Hongk. 458, 1861.
Drynaria tridactylon Fee, 1850-52.
Polypodium Hancockii Bak., Jour. 106, 1885.
Polypodium micropteris Bak., Kew Bull. 14, 1906.
Polypodium aquaticum Christ, Nova Guinea. VIII. 153, 1909.

Rhizomes wide-creeping, hypogaeous, the emergent portions clothed with blackish lanceolate-subulate scales; stipes 10-15 cm. long, sometimes scaly; frond varying from oblong-lanceolate entire to ternate or pinnatifid, with a large terminal lobes 10-23 cm. long, 2.5-5 cm. broad and 2 smaller ones on each side; texture thin, but firm; color dark-green; both sides naked; areolae fine, copious, the main veins not distinct to the edge; sori small, usually irregularly scattered, rarely strictly uniseriate, round to oblong and occasionally become confluent and grammitoid.

Formosa, North India, Malacca, Philippines, China; Kweichow, Kwantung, Kwangsi - Lungchow.

A very polymorphic species in regard to the dimension and shape of the frond as well as the arrangement of sori. The plant often grows immersed in water of stream and, the substance of fronds is thin and firm; when grows in drier situation the texture becomes thicker.

83. Polypodium euryphyllum C. Chr. Ind. 525, (1905); Matthew 378, (1911).

Polypodium dilatatum Wall., 1828, HK. Sp. 5. 85, 1863; HKBK. 365; Christ 112; NPfl. 318.
Pleopeltis dilatata Bedd., 1866.
Drynaria acuminata Brack., 1854.
P. 402) Polypodium expansum Baker, 1876.

Rhizome thick, woody, the scales large, ovate, dull brown; Stipes 30 cm. or more long, with a narrow decurrent wing reaching nearly down to the base; frond 45-90 cm. long, 30 cm. or more broad, cut down within 6-25 mm. of the rachis into acuminate entire erecto-patent lobes 10-20 cm. long, 1.2-3.7 cm. broad; texture papyraceous; both sides naked; main veins fine, wavy, falling rather short of the edge, with copious fine areolae including free veinlets; sori small, copious, scattered irregularly, often confluent.

N. India, Samoa, Ceylon, Malacca, Hongkong, China: Kwantung, Kweichow, Szechwan - Omei Shan.

84. Polypodium faberi Christ, Bull. Soc. Fr. 52. Mem. I. 17, (1905); Matthew 378, (1911).

Rhizomes creeping, clothed with fuscous setiform scales; stipes strong, naked, brown, 14 cm. long; lamina broadly deltoid, 35 cm. long, 20 cm. broad, simple pinnate; pinnae 9 on each side of the rachis with a similar terminal pinna, remotely separated by rounded sinuses, acuminate, base broadly adnate-(wing absent), 2 cm. broad, very shortly denticulate, the lateral veins numerous, (30 on each side) 2½ mm. apart; veinlets partly free, partly anastomosing; sori close to costae, 1½ mm. broad, brown-ochraceous, uniseriate, occupying the upper part

of the pinnae; texture herbaceous, color obscure green.

Szechwan - Omei shan.

Perhaps identical to P. oxylobum

85. Polypodium trichophyllum Baker, Kew. Bull. 15, 1906; Matthew 383, (1911).

Stipes very short, densely caespitose, sorbid brown, densely clothed with patent hairs, stramineceous-brown; lamina elastic, pendulous, lanceolate, 15-23 cm. long, 2-2.4 cm. broad at the middle, simple pinnate, gradually attenuated towards the base, green and pillose on both surfaces; pinnae lanceolate, multijugate, 2 mm. broad, base adnate, pinnatifid towards the middle, lobes erect-patent, ovate-deltoid obtuse, costa immersed, concolored; veins simple, short, erecto-patent, cospicuous; sori lax, ~~bb~~ globose, superficial, near the costa.

Yunnan.

Allied to Polypodium repandulum Mett. differs by fronds being pilose on both surfaces and pinnae become pinnatifid towards the middle.

86. Polypodium connatum Christ, Bull. Geogr. Bot. Man. 141, (1906); Matthew 377, (1911).

Rhizomes slender, creeping, clothed by subulate, minute adpressed scales; stipes slender, ebeneous-gray, smooth in other parts, articulate, 15-20 cm. long, subflexuous; lamina 15 cm. long, 10 cm. broad, broadly ovate, cuminate, bipinnatifid, pinnae on each side 5 or 9 under the pinnatifid apex, strictly opposite, the lowest ones erecto-patent, upper ones horizontal-patent, 6-7 cm. long, remote, acuminate, irregulerly lobato-pinnatifid, the lower ones pinnate down to a narrow wing, the lowest lobes 3cm. long, 8 mm. broad, coursely serrate, teeth acute; the base of pinnae broad, cruciately adnate, quadrate biauriculate; principal veins oblique, forked, the secondary veins irregulerly hidden; texture subcoriaceous, dark brown, opaque abo~~f~~ve paler below; sori numerous, close to the costa in lobes, many, 1 mm. broad, almost rounded, dark-brown, not immersed.

Kweichow.

(P. 403).
87. Polypodium tatsienense Franch. et Bureau, Mss; Christ, Bull. Soc. Fr. 52, Mem. 1. 19, (1905); Matthew 385, (1911).

Stipes 20 cm. long, slender, naked, like other parts stramineous-ochraceous; lamina 15-20 cm. long, 12 cm. broad, pinnate with a central petiolate pinna (petiole 5

cm. long), 10 cm. long, 3 cm. broad oblong, caudato-acuminate, base ovate, margin cartilaginous-thickened and quite undulate; lateral pinnae 2 or 4, sessile, remote, similar to the terminal one but cuneate at base; costa prominent, lateral veins distinct, parallel, straight, extending to the margin, numerous (45 on a side of the costa), 2 mm. far apart, anastomosing, areolae with free clavate veinlets; sori uniseriate along the costa, medial, numerous, rounded, brown, 1 mm. broad, not immersed; texture thinly coriaceous, color dark-green punctated with minute white calcareous irregular dotes on the upper surface, glauscent and opaque below.

Szechwan.

88. Polypodium wallichianum Spr. Syst. 4. 53, (1827); Matthew 384, (1911).

Polypodium juglandifolium Don, Prod. Fl. Nepal. 3, (1825), HKBK. 368, Christ. 114; NPfl. 321.
Pleuridium wallichianum J. Sm., 1857.
Polypodium capitellalum Wall., 1828.

Rhizomes stout, woody, the scales large, ovate, bright-ferruginous; stipes 30 cm. or more long, firm, erect, glossy; fronds 45-60 cm. long, 30 cm. or more broad; pinnae in pairs 2.5-5 cm. apart, 10-20 cm. long, 2.5-3.7 cm. broad, the apex acuminate, the edge thickened and wavy, the base rounded; texture subcoriaceous; both sides naked; main veins distinct to the edge; areolae copious, hidden, with free veinlets; sori large, one between each main vein, forming a row nearer the midrib than the edge.

India, China: Yunnan, Kweichow.

89. Polypodium himalayene Hooker, Sp. 5. 91, (1863), HKBK. 379; Christ 114; NPfl. 321; Matthew 379, (1911).

Polypodium venustum Wall., 1828.
Pleopeltis himalayene Bedd., 1869.
Pleuridium himalayene J. Sm., 1857.
Arthromeris himalayene J. Sm., 1875.
Polypodium mairei Brause, Hedwigia 54, 208 t. 4, f. n. 1904.

Rhizomes woody, wide-creeping, the scales linear, squarrose, bright-brown, stipes 30 cm. or more long, firm, glossy; fronds 30-60 cm. long 20-30 cm. broad, the pinnae in pairs 2.5-5 cm. apart, 10-20 cm. long, 3.7-5 cm. broad, the apex acuminate, the edges cariose, wavy, the base rounded or even cordate; texture subcoriaceous; under surface finely pubescent; main veins very distinct; areolae fine, close, with copious free veinlets; sori in 1-2 rows of 3-4 each between the main veins.

N. India, Japan, China: Kweichow, Yunnan, Szechwan - Omei Shan.

Mettenius unites this with Polypodium juglandifolium, but the pinnae are much broader, with prominent veins and distinct scariose wavy edge --- Hooker.

90. Polypo~~d~~dium lehmanni Mett. Pol. 117. n. 229 t. 3 f. 35, (1857); HKBK. 369; Christ 114; Matthew 380, (1911).

Polypodium moulmeinensis Bedd., 1867.
Pleopeltis lehmanni Bedd., 1868.
(P. 404).

Rhizomes woody, wide-creeping, the scales long, rigid, fibrillose yellowish-brown; stipes 15-23 cm. long, firm, erect, naked; fronds acuminate, 45-60 cm. long, pinnate; pinnae opposite or subopposite, sessile, articulate at the base (the terminal one long petiolate), lanceolate, entire, with a caudate acumination, 10-15 cm. long, 1.2 cm. broad, superior base obliquely excised, inferior amplexicaule; texture subcoriaceous; rachis and both sides naked; main veins distinct to the edge, with two rows of sori 3-4 deep between them.

Darjeeling, Sikkim, Formosa, China: Yunnan, Kwantung, Szechwan, Kweichow.

91. Polypodium cantoniense Baker, JoB., 304, (1879); NPfl. 316.

Gymnogramma contoniensis Baker, HK. Ic. Pl. t. 1685.

Rhizomes slender, wide-creeping, scales lanceolate, adpressed, membranceous, black, clathrate; fronds strongly dimorphous, the sterile small, ovate, obtuse, entire, base rounded or truncate or subcordate, 5-7.5 cm. long; the stipes of equal length, naked, shinning; veins inconspicuously immersed, the main ones straight and distinct to 3/4 way from costa copiously anastomosing in irregular areolae; fertile fronds lanceolate or narrowly lanceolate, 7.5 cm. long 4-6 mm. broad in the middle, cylindrical and confluent.

Canton: banks of the North River.

92. Polypodium pedunculatum (HK. et Grev.) Mett; Salom. Nom. 312, (1883); Matthew 381 (1911).

Ceterach pedunculatum HK. et Grev., Ic. Fil. t. 5, 1827.
Gymnogramma hamiltoniana HK., 1864, HKBK. 389.
Grammitis hamiltoniana Wall., 1828.
Selliguea hamiltoniana Bedd., Ferns. Br. Ind. 390. f. 226. 1868.
Polypodium hamiltonianum Diels, NPfl. 316.
Selliguea hamiltoni et Hookeri Presl., 1836.

Rhizomes wide-creeping, woody, the scales linear, dull-brown; fronds dimorphous, the barren ones 30 cm. long 7.5-10

cm. broad, elliptic oblong, entire, glabrous, acuminate, very gradually tapering at the base, the stipes 5-12 cm. long, winged towards the apex by the decurrent base of the frond; the fertile ones 10-15 cm. long, 3.7 cm. broad, the stem more than 30 cm. long, slender, naked; texture subcoriaceous; both sides naked; main veins distinct to the edge, with copious intermediate areolae with free included veinlets; sori in broad broken or continuous rows, one between each main vein and parallel with them.

East Himalayas, China: Hupeh, Yunnan, Kweichow.

93. Polypodium cavaleriei Ros. Fedde Repert. 13, 597, t. 43, (1916).

Rhizomes long-creeping, about 2-3 mm. thick, paleae dark-brown, lanceolate, 2 mm. long, 1 mm. wide, pundtate-denticulate or entire; stipe 5-15 cm. long, slender, subflexuous, pale brown, sparcely adspersed beneath with paleae; lamina subdimorphic; the sterile to 20 cm. long, including stipes, 2 cm. broad, elongate-lanceolate, acuminate, narrowed toward the base, margin irregularly crenate-repand or lobed below the middle, lobes linear obtuse, to 1 cm. or more long, ¾ cm. broad; texture membranaceous, surfaces smooth; midrib prominent on both sides, rarely adspersed with paleae; primary veins extending at almost right angles and disappeared when extending a little over the middle of lamina and forming with fine veinlets 3 rows of irregular areolae between costa and margin with free and simple, rarely furcate included veinlets; fertile lamina narrower than the sterile, about 1 cm. wide or slightly wider; sori linear, continuous, about [illegible] cm. long, placed along pri-
(P. 405).
mary veins, about 3½ mm. far. apart.

Kweichow: Gan-chuen.

Differ from allied species, Polypodium wrightii (HK) and Polypodium leveillei Christ, in fronds being dimorphic, having fewer teeth, and irregular formation of areolae between midrib and margin; from the first species it further differs; by its lobed margin, from the second, by its numerous forking of the veins. Polypodium membranacea (Bl.) though somewhat similar to this species in venations, has broader fertile fronds, closer veins and sori and entire margin of the frond.

94. Polypodium wrightii (HK.) Mett.; Diels, NPfl. 316, (1899): Matthew 384, (1911).

Gymnogramme wrightii Hooker, Sp. 5. 160 t. 303, 1864; HKBK. 388.

Selliguea wrightii J. Sm., 1875.

Rhizomes firm, wide-creeping, the scales small, dull-brown; stipes 7.5-10 cm. long, firm, naked; fronds 30-45 cm. long, 2.5-3.7 cm. broad, apex acute, the edge irregularly repand, narrowed suddenly about the middle and below this very gradually into the stem; texture papyraceo-herbaceous; both sides naked; main veins distinct to the edge, but zigzag and very slender; areolae copious with free included veinlets; sori in continuous oblique parallel rows one between each main vein.

Loochoo, Formosa, China: Kwantung, Fukien.

95. Polypodium henryi Diels, NPfl. 316, (1899); Matthew 379, (1911) Gymnogramme henryi Baker, JoB. 171, 1887.

Rhizomes epigaeous, wide-creeping, 2 mm. in diameter; paleae small, lanceolate, membraneous, patent, dull brown; stipes slender, naked, stramineous, fertile fronds nearly 30 cm. long, 2-2½ cm. broad at the middle, narrowed suddenly at or about the middle and below this very gradually downward; texture moderately firm, green and glabrous on both surfaces; veins fine; areolae copious, with free included veinlets; sori erecto-patent reaching from the midrib nearly to the edge in continuous or broken erecto-patent parallel linear.

Yunnan, Hupeh, Kweichow, Szechwan.

Allied to Polypodium wrightii (HK.) Mett.

96. Polypodium macrophyllum (Bl.) Reinw. Mett. Fil. Lips. 37 t. 25 f. 22-23, (1857), Pol. n. 213; Christ 108; NPfl. 316; Matthew 380, (1911).

Selliguea macrophylla Bl., Fl. Jav. Fil. 127 t. 53, 1828.
Gymnogramme macrophylla Hooker, 1564, HKBK. 388.

Rhizomes creeping, the scales lanceolate, dull brown, stipes 5-15 cm. long or very short, naked; fronds 30-45 cm. long, 7.5-10 cm. broad, narrowed gradually to both ends, the edge entire or repand; texture papyraceous; main veins distinct but slender and zigzag, with copious uniform subquadrangular areolae with free veinlets between them; sori in single continuous or slightly interrupted rows between the main veins.

Philippine, Malesia, North Guinea, China: Kwantung, Szechwan, Anhwei, Fukien.

Var. forkiene Copel, Phil Journ. Sci. Bot. III. 283, (1908).

Leaves close, strong hastate at base, rarely pinnatifid, decurrent along stipes.

Fukien, Kwantung.

(P. 406).
97. Polypodium leveillei (Christ) C. Chr. Ind. Suppl. 60 (1906)-
13.

Selliguea leveillei Christ in Bull. Geogr. Bot. Mans (1906) 236.

Rhizome wide-creeping, 3 mm. across, black, clothed with black sparse rigid setaceous scales; stipe stramineous, solitary, 1-3 cm. apart, slender, sharply angular below, 10-15 cm. long, with the base of frond gradually decurrent long it into a long narrow wing on each side; frond about 20-30 cm. long, 2.2-4 cm. broad, or broader at the middle, narrowly lanceolate, acuminate, suddenly narrowed near the base and long decurrent along the stipe, margin crispato-undulate and obscurely crenate, costa prominent on both sides, stramineous, lateral veins obliquely patent, extending to the margin at acute angles, stright or subflexuose, about 30 on each side, the middle ones [illegible] cm. apart, very slender, areolae between transverse veins about 5, oblong-rectangular with simple clavate retrorsed included veinlets; sori running along the lateral veins from the costa to the margin, very slender, brown; texture flaccid, herbaceous, light green, and glabrous on both surfaces.

Yunnan, Kweichow, Kwangsi.

A close ally to P. wrightii (HK.) Mett. which, however, has much narrower frond, not abruptly narrowed towards the base and numerous copiously forked, included veinlets. A pretty fern, discovered by Pere Cavalerie in Kweichow, 1904, growing on moist banks of stream.

98. Polypodium selliguea Mett. Pol. 111 n. 214, (1857); Christ
108; NPfl. 315; Matthew 382, (1911).

Grammitis membranacea Bl., Enum. 118, 1828.
Selliguea membranacea Bl., Fl. Jav. Fil. 125 t. 52 f. 2.
1828.
Gymnogramme membranacea Hooker, 1864, HKBK. 388.
Gymnogramme sayeri F. Muell. et Bake., 1887.

Rhizomes wide-creeping, the scales small, linear, nearly black; stipes 5-15 cm. long, nearly naked; fronds 15-30 cm. long, 1.2-3.7 cm. broad, apex much acuminate, margin entire, the lower part narrowed very gradually; texture papyraceo-herbaceous; both sides naked; primary veins distinct to the edge, but zigzat and very slender, united by similar transverse veinlets so as to form large hexagonal areolae; sori in oblique parallel interrupted lines, one between each main vein.

Malayas, Philippine, Hongkong, S. China.

99. Polypodium heterocarpum (Bl.) Mett. Fil. Lips. 37 t. 25 f. 24-25, (1857); Pol. n. 211; NPfl. 316.

Grammatis heterocarpa Blume, 1828, Enum. 118.
Selliguea heterocarpa Bl., 1828, Fl. Jav. Fil. 125 t. 52 f. 1.
Selliguea heterocarpa Bl., 1828, Fl. Jav. Fil. 125 t. 52 f. 1. 1828.
Gymnogramme heterocarpa HK., HKBK. 389.
Polypodium mettenanum Ces., 1876.

Rhizomes wide-creeping, the scales dense, 6 mm. long, linear, full-brown; stipes 15-23 cm. long, firm, erect, naked; fronds 15-30 cm. long, firm, erect, naked; fronds 15-30 cm. long, 2.5-5 cm. broad, the point much acuminated, the edge entire, the lower part narrowed very gradually; glossy; main veins distinct to the edge, the veinlets hidden; sori linear-oblong, immersed, one between each main vein, not extending to the edge or midrib.

(P. 407).
100. Polypodium monchangense C. Chr. Ind. Suppl. 60, (1913).

Selliguea cochlearis Christ, Bull. Geogr. Bot. Man. 142, (1907).

Rhizomes creeping, scarcely thick as goose's quill, dark brown, clothed with very fine soft brown setae 3 mm. long, leaves remote, stipes like rachis light- orange-coloured, winged on both sides, 10 cm. long, teret-sulcate, slender; lamina decurrent gradually downward in a wing, 15 cm. long, broadly ovate and dilated above the middle 6 cm. broad, acuminate, often truncate, the wing ½ cm. broad at the middle, undulate, margin repando-crenate, texture subcoriaceous; veins almost hidden, numerous, oblique, reaching the margin, flexuousa, 2 mm. apart; areolae polygonous, with including clavate continuous veinlets; sori placed along free soriferous veins between every two other adjoining sterile ones, 20-25 on each side, oblique, ½ cm. apart, the middle ones 4 cm. long, dark-brown, convex, 2-3 mm. broad, extending almost from the rachis to margin, subcontinuous; rachis raised, lustreous, color dark-green above, paler green and opaque below.

Yunnan.

101. Polypodium triglossum Baker in Kew Bull. (1898); C. Chr. Ind. 571 (1906); Matthew in Journ. Linn. Soc. 39; 383 (1911).

Selliguea tripylla Christ in Bull. Boiss. 6: 878 (1899).

Rhizome creeping, epigaeous, clothed with small lanceolate, membranecous, ferruginous dense scales; stipes subnaked,

slender, brown, 30-45 cm. long; frond deltoid, 30-40 cm. long trisect into 3 ascending lanceolate segments, the middle one the largest, to 40 cm. long, the two lateral ones somewhat shorter, 4-5.5 cm. broad, gradually tapering towards both ends, sinuses rounded, cleft down to 2-5 cm. from the base of the frond, margin entire or obscurely undulate; texture chartaceous, green and glabrous above, pale and sparsely clothed near the costa beneath with adpressed membranoceous dark-brown peltate or ovate cuspidate scales; venations prominent, the lateral veins parallel, erect patent, extending almost to the margin, intermediate veinlets anastomosing copiously into small hexagonal areolae with free included veinlets; sori small, oblong, superficial, scaly, uniseriate or tending to be biseriate along the costa between main veins.

Yunnan.

The discover of this beautiful species was indebted to Dr. A. Henry, who found it in the mountain forest in the district of Mile, Yunnan, and so far not yet known elsewhere. It is nearest to the large trifid forms of P. pteropus Blume, differs by larger sori, the presence of ovate-lanceolate dentate-ciliate dark brown scales on the under of ovate-lanceolate dentate-ciliate dark brown scales on the under surface, the strongly dentate and conspicuously clathrate peltate scales in the sori and by the veinlets not forming distinct series of areolae. It is perhaps most interesting to note that this species distinct from most of the member in § Selliguea by rather very short sori, which vary from long oblong or oblong to almost globular towards the apex of the segments; a few short linear ones are, however, occasionally present near the basal part and very close and parallel or subparallel to the costae. In this respect it is not perhaps without reason to consider it as linking species between § Selliguea and § Pleopeltis, which generally as sori not more than three times as long as broad.

(P. 408).
102. Polypodium digitatum (Baker) C. Chr. Ind. 522, (1906); Matthew 378, (1911).

Gymnogramme digitata Baker, JoB. 267, 1890.
Grammitis finlaysoniana Wall., 1829.
Selliguea finlaysoniana Moore, 1857.
Gymnogramme finlaysoniana Baker, Ann. Bot. 5: 486, 1891.

Rootstocks wide-creeping, hypogaeous, 1.2 cm. in diameter; stipes remote, naked, stiff, erect, 30 cm. or more long; fronds delttoid, membranaceous, glabrous, 15-23 cm. long and broad, cut down nearly to the base into five entire lanceolate acuminate segments about 15 cm. long and 2.5 cm. broad; sori linear, erecto-patent, parallel, produced from the midrib nearly to margin; venation of Polypodium ellipticum.

Tonkin, Cochinchina, China: Yunnan, Kwangsi.

103. Polypodium anceps (Christ) C. Chr. Ind. 509, (1906); Matthew 377, (1911).

Selliguea anceps Christ, Bull. Boiss. 6. 879, 1898.

A largest fern of its kind; rhizomes woody, thick, naked, suberect; stipes brown below, green above, solitary, thick as a swan's quill, 80 cm. long, rather plane with a narrow wing which is decurrent almost down to the base; leaves ample, 1 m. or more long, 40 cm. broad, ovate, apex deficient; pinnatifid down to the rachis, pinnae numerous, ovate-oblong, acuminate, very entire, 20 cm. long, 4 cm. broad, much far apart (the interstices to 7 cm. wide) attenuate towards the base and broadly decurrent along the rachis, the wing broader above, gradually narrowed downward, costa conspicuous; lateral veins straight, not touching the margin; veinlets, often 1 cm. distant; sori between lateral veins [illegible]-12, irregularly placed, sparce, (bi- or triseriate), small, oblong or almost rounded, rarely linear; texture herbaceous, light green, entirely glabrous.

Yunnan.

Near or a form of Polypodium euryphylla C. Chr.

Henry's no. 9554 identified by Christ as Aspidium decurrents in "Fougeres de mentze," Bull. Boiss. vi. 969, (1898) is evidently wrong and the specimen is entirely identical with his type except a younger form with fewer sori.

104. Polypodium flexilobum Christ, Bull. Geogr. Bot. Mans. 107 (1904). Matthew 379, (1911).

Selliguea elliptica Thunb. var. flagellaris Christ, Bull. Boiss. 7. 6. 1899 (non Polypodium flagellare Christ, 1896).
Selliguea flexiloba Christ, 1906.
Polypodium faurianum Nakai, Fl. Koreana 316 (1911).
Selliguea coriaensis Christ, Fedd. Report. 5: 11 (1908).
(non Polypodium coraiense Christ 1908).

Differs from Polypodium ellipticum by linear-lanceolate, pinnae only [illegible] cm. broad, with a long slender point 2-3 cm. long, 1[illegible] mm. broad, the base of the pinnae decurrent in a wing along the rachis which extends downward of the stipe, which 10-20 cm. long.

This an extreme form of Polypodium ellipticum and I am rather of the opinion of regarding this as a variety of it as christ first did with it.

Kweichow, Yunnan.

(P. 409).
105. Polypodium ellipticum Thunb. Fl. Jap. 335, (1784); Benth. Fl. Hongk. 457, 1861; Christ 107; Mifl. 319; Matthew 378,

1911.

Gymnogramma elliptica Baker, 1868, FKoK. 388.
Selliguea elliptica Bedd., 1870.
Gymnogramma decurens Hooker, 1827.
Gymnogramma pentaphylla Baker, 1898.

Rhizomes woody, wide-creeping; stipes 30 cm. or more long, firm, erect, naked, stramineous; fronds often dimorphic, 30-45 cm. long, 15-23 cm. broad, cut down nearly to the rachis in the upper and quite in the lower part into 4-6 linear-oblong pinnae on each side, which are 15-20 cm. long, 1.2-3.7 cm. broad, or sometime subpalmately divided into 3-5 lobes, more rarely quite simple or quite pinnate; texture herbaceous; rachis and both sides naked; main veins slender, not distinct to the edge; areolae large and unequal, with free clavate veinlets; sori linear oblique, reaching the midrib, but not the edge.

Himalayas, Formosa, Japan, Philippines, Queensland, Hongkong, China: Szechwan, Hupeh, Hainan, Kwantung, Yunnan, Kweichow, Fukien, Anhwei, Chekiang, Hunan.

Var. undulato-repandium C. Chr. Bull. Geogr. Bot. Man. XXIII. 141, (1913).

Different from type in the margin of wings and pinnae being undulato-repand; texture thin herbaceous, color obscure; pinnae 5-6-jugate, broad elliptic, 10-12 cm. long, 2-2½ cm. broad in the middle; the terminal pinnae much the largest, 3-3½ cm. broad.

Kweichow: Pin-fa.

Tribe X. Cochlidieae

Like Vittarieae in habit, but rhizome erect, scales bright-brown, not clathrate, hidden among the leaf bases. Leaves tufted, veins free, forked, rarely anastomosing; sporangia with 2 stomium-cells, forming two confluent or distinct exinduciate coenori parallel to the midrib in the apical portion of the globose, containing chlorophyll.

Tribe XI. Vittarieae

Grass-like fern with creeping rhizome, scales dark-brown or blackish, clathrate, not hidden among the leaf-bases. Leaves bisseriate; veins free; coenori marginal or intramarginal or costular, extending over the entire length of the fronds; paraphyses present; spores devoid of chlorophyll.

Key to Genera of Cochlidieae and Vittarieae

1. Rhizome erect, scales light brown; sori without paraphyses and sporangia with 2 stomium-cells (Cochlidieae)..67. Scleroglossum
   2. Rhizome creeping, scales dark-brown or blackish; sori with paraphyses and sporangia with 4 stomium-cells (Vittarieae).
      3. Sori on or close to the costa, often protected by a lateral, raised outgrowth of leaf-tissue.................................68. Monogramme
      3. Sori more or less deeply immersed in mostly 2-lipped, marginal or submarginal grooves or with the margins rolled, back over them when young, midrib present, veins free...............69. Vittaria.

67. Scleroglossum v. A. v. Rosesburgh, Bull. Jard. Bot. Buit. II. ser. vii. 37 t. 5. (1912); Handb. Suppl. 339; C. Chr. Dansk Bot. Arkiv. 6. 3. 25- pl. II. f. 1-8, (1929).

Type: Villaria pusilla Bl.

Sori long, linear, deeply immersed in submarginal or intramarginal grooves, i. e. protected (separated) by the much produced (thickened and widened) costal parenchyma, which is sometimes as broad as the lamina, no paraphyses. Fronds linear, narrow, simple, rarely forked, rigidly coriaceous, thick, much thickened in the fertile region, sometimes as thickened as broad; veins free, ascending, simple or forked, indistinct or invisible.

A small genus of 6 closely related species, confined to tropical Asia, Australia and Polynesia, which certainly resemble the species of Cochlidium, a genus endemic in America, in general habit, rhizome, scale and shape and texture of the leaves but differs by the following character~~s~~s: surfaces and margins of leaves furnished with scattered minute, stellate brown hairs, which are very deciduous and often not found in dried specimens, but probably they tissue, simple or more commonly furcate, or irregularly branched, the branches sometimes anastomosing. Coenosori confined to the apical portion of the lamina, mostly medial between the edge and midrib, which is hidden in a costa parenchyma between the two sori, never close to the midrib as in Cochlidium,

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deeply immersed in two oblique grooves, the mouth of which opens either toward the edge or vertically and in some forms (not Chinese) is truly marginal as in Euvittaria, the inner side of the grooves often somewhat produced and covering the young sori. Paraphyses none (or very few and small, consisting of 1 or 2 cells, cf. Goebel, l. c.).

Scleroglossum pusillum (Bl.) v. A. v. R. l. c. pl. V. fig. 1.
2, (1912); Handb. Suppl. 340 pro parte; C. Chr. Dansk
Bot. Arkiv. 6. 3. 27 pl. II. f. 2-3, (1929).

Vittaria pusilla Bl., Enum. 199, 1828.

Taenitis pusilla Mett., Ann. Mus. Lugd. Bat. 4. 172 pl. 4 f. 13-14, 1869, with full description.

Pleurogramme pusilla Christ, Phil. Jour. Sci. 2. C. 175, 1907.

Taenitis simplicivenia Cesati, Rendic. Acad. Napoli. 16. 30. 1877.

Monogramma in~~e~~tredia Copel., Elmer's Leaflets 2. 408, 1908.

Leaves subcoriaceous to coriaceous, 5-10 cm. long, 2-4 mm. broad, rarely larger, acutish or obtuse, often sinuate; veins mostly forked or irregularly branched sometimes anastomosing, protruding beyond the sori; the marginal stellate hairs often present in dried specimens. Coenosori in the apical third, rarely half the blade, distinctly inframedial, the inner edge of the groove usually acute and somewhat produced over the sori the outer attenuate toward the margin and generally half as broad as the costal parenchyma, the mouth of the groove opening toward the margin.

Java, Sumatra, Borneo, Malayan Peninsula, Siam, Annam, Philippines China: Hainan. (McClure 8691).

Vittarieae

68. Monogramma Schkuhr, Krypt. Gewachse 1. 82. (1809); Desvaux Berl. Mag. 5. 302, (1811).

Type: Pteris graminea Poir.

Sori subimmersed, linear or elongated, either placed on or close to the midrib on one or both sides of leaf-tissue; veins consisting only of a costa or in some species with indistinct lateral veins in addition to the midrib; fronds small narrow, linear, grass- or rush-like, simple or rarely subdichotomous, not articulate to the rhizome; rhizomes creeping. In structure this is the simplest of all ferns ("mono," one; "gramme," a line, alluding to the sori in a single line on each frond.)

Sp. 18. mostly in tropical Asia, A few in America, 1 recorded from China.

Monogramma robusta (Christ) C. Chr. Ind. 431, (1906).

Pleurogramme robusta Christ, Bull. Boiss. vi. 867, 1898.

Rhizome short, erect or shortly creeping, naked, densely fibrousrooted; leaves subfasciculate, subtended at base with black subulate scales, green, linear acutish very shortly decrescent into the stipes very rigid, 20 cm. long, 3 mm. broad, costa grayish white, 1 mm. broad, immersed above, margin involute; sori linear in a furrow between costa and margin placed above the middle of and below the apex of the leaves, margin forms a very narrow pseudo-indusium over the furrow, sori at last protruding and contiguous to the costa, ochraceous.

A remarkable plant for its stiff and rigid texture and the broad whitish costa resembling the leaves of crocus.

Yunnan: Mentze.

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69. Vittaria J. E. Smith, Mem. Acad. Turin, 5.
413 t. 9~~1~~, (1793).

Type: Pteris lineata L.

Sori superficial or deeply immersed in a continuous marginal or slightly intramarginal line; in the former, they are snnk in a two-lipped marginal grooves, while in the later the unaltered edge of the frond produced beyond often rolls over~~tt~~ the slightly intramarginal sporangial line. Fronds several to very numerous simple, linear, entire smooth, ascending and rigid or flaccid and pendulous, from a few inches to 2-3 ft. in length the costa percurrent, venation simple, reticulate, the lateral veins distant, obliquely parallel and forming acute angle with the midrib jointed at their apices by a transverse intra marginal vein; spores diplanate or triplanate; paraphyses usually present. Rhizomes erect or short-creeping, often interlaced, densely clathrate-paleaceous. (Latin. "vitta," a riband, alluding to the very narrow, ribbon-~~l~~like form of the fronds).

A genus of about 50 species, tropical and subtropical, of both hemispheres, mainly epiphytic ferns of small or medium size and of grass-like or rush-like habit. About 10 well-defined species recorded in China.

Key to Species.

1. Sorus sunk in two-lipped marginal groove, lateral veins free (Euvittaria).
    2. Frond above 1 cm. (1-1.8 cm.) broad, over 70 long..............................1. V. pauciareolata
    2. Frond to 8 mm. broad, to 50 cm. long..2. V. elongata
    2. Frond 3 mm. broad, 4-10 cm. long..3. V. sulcata
1. Sorus sunk in intramarginal furrow, lateral veins free (Taeniopsis).

2. Sorus in slightly intramarginal narrow furrow, with the unaltered edge of the frond produced beyond and often more or less covering it as inducium.
  3. Frond rather long-stipitate (stipes to 6 cm. long).
    4. Frond acicular, 3 mm. broad..4. V. filipes
    4. Frond linear-lanceolate, 5-7 mm. broad..5. V. lanceola
  3. Frond shortly stipitate or subsessile.
    4. Frond 1 mm. broad, to 25 cm. long.
      5. Frond acute at apex, sori short, confined to the upper 1/3 portion of the frond..6. V. nana
      5. Frond acuminate at apex, sori much longer..7. V. caricina
    4. Frond 3-8 mm. broad.
      5. Stipes rather remote, soral furrow submarginal.
        6. Costa prominently raised below, plants above 15. cm. long...8. V. lineata
        6. Costa scarcely prominent below, plants of smaller dimension..9. V. modesta
      5. Stipes densely tufted, soral furrow submarginal....................10. V. flexuosa
2. Sorus in intramarginal broader furrow with a plane and broad edge of the frond.
  3. Frond 6 mm. broad, 25 cm. long; sori somewhat midway between margin and midrib..11. V. costata
  3. Frond ≮ 3 mm. broad, 30-40 cm. long; sori intramarginal..........................12. V. suberosa

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1. Vittaria pauciareolata Ching, Sinensia 1: 11 (1929).

Rhizome creeping, rather thick; paleae dense, blackish, lanceolate with a long hair-pointed apex, distinctly reticulate, 5 mm. long. Fronds remote, grass-like, 90-130 cm. long including stipes, which are 10-14 cm. long, terete, naked, 1.3-1.5 cm. broad, linear, tape-like, pendulous, gradually attenuate from 2/3 way downward into the stipes, but not o/very slightly narrowed towards a cent, flaccid, midrib flattend and indistinct on both surfaces lateral veins slender, 3-4 subparallel to the midrib, transluscently distinct and connected by a transversal intramarginal vein, not rarely forked and often towards the apex of the frond pauciously anastomosing into narrow linear meshes. Sori long, reaching from near the base to the very apex, sunk in anextrorse marginal groove, 1/10 cm. deep.

Kwangsi.

A large dense tufted fern with profuse, pendulous, and grass-like, light green flaccid fronds, remarkable for its

tendancy in the upper lateral veins for forking and anastomosing, a character not heretofore noticed in any known species of the section EUVITTARIA.

Species allied to V. zosterifolia Willd. from Malay, differs in midrib being flattened, fronds almost not narrowed toward a broad rounded apex, and the tendency of forming and anastomosing in the upper lateral veins.

2. Vittaria elongata Sw. Syn. 109. 302, (1806); HKBK. 395; Christ 53; NPfl. 299; Matthew 391, (1911).

Oetosis elongata Greene, 1900.
Vittaria an odontolepis Fee, 1851-52.
Vittaria loricea Fee, 1851-52.

Frond 15-45 cm. long, 3-6 mm. broad, the point acute or bluntish the lower parts narrowed very gradually to the base, texture subcoriaceous midrib faint or distinct; veins simple, oblique, immersed, parallel, connected by an intramarginal veinlet; lips which open outwards.

Europe, India, Philippines, Formosa, Korea, China: Hainan, Kwantung, Kwangsi, Yunnan, Kweichow, Szechwan, Fukien.

3. Vittaria sulcata (Mett.) Kuhn, Linn. 36. 68 1869; HKBK. 518; Christ 53.

Pleurogramme sulcata Mett., msc.
Taenitis simplicivenia Ces., 1877.

Rhizome short creeping; scales dense, lanceolate, pale-brown; frond crowded, ligulate, obtuse, sessile, narrowed to the base, 5-10 cm. long, 3 mm. broad; sori in an intramarginal deep furrow confined to the very much thickened upper half of the frond, where the midrib and veins quite lost; midrib visible in the barren lower half; veins forked; margin beyond the sorus as thick as the central portion of the lamina.

Ceylon, Society Islands, China.

A small fern with blunt apex of the leaves, sori confined to the upper part of the margin and with very thick edge of the groove.

4. Vittaria filipes Christ Bull. Geogr. Bot. Man, 150, (1907); Matthew 391, (1911).

Rhizomes thick, horizontal, radicose, clothed with short subulate black setaes; leaves numerous, densely fasciculate; stipes very slender, 16 cm. long, 1 mm. broad, dark-green; lamina 12 cm. long 3 mm. broad acuminate narrowly lanceolate, gradually narrowed downward, costa slender but prominente;

veins strongly oblique, almost parallel to the midrib sori 1 mm. broad, continuous from the base of lamina
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extending to the apex, margin more or less indusiformly revolute; co~~l~~lor dark-green, opaque, texture subcoriaceous, firm.

Fukien, Kwantung, Kweichow.

5. Vittaria lanceola Christ, Bull. Boiss, 4. 674, (1896).

Nearest to V. lineata Sw. differs in much larger dimension. Frond distinctly petiolate (petioles 3-4 cm. long), quite elongate, linear-lanceolate, 5-7 mm. broad, costa prominent; lateral veins oblique, slightly visible; texture coriaceous; sori line covered by reflexed margin.

A species somewhat intermediate between V. scolopendrina Thwait and V. linata Sw.

May be a form of V. japonica Miq.

Japan, China.

6. Vittaria nana China, Sinensia 1: 11 (1929).

Rhizome creeping, slender, clad in moderately dense dark castaneous, short linear-subulate paleae with obscurely denticulate margin. Fronds numerous, caespitose, erect, 3-7 cm. long, 1-1½ mm. broad, linear gradually narrowed into the base of a short stipe, slightly narrowed towards a blunt, rarely acuminate apex, margin revolute, midrib deeply sulcate above, ~~A~~ broadly keeled below; texture subcoriaceous, flaccid, glabrous, veins hidden. Sori short, confined to upp 1/3, and quite a way short from the apex, often one-sided, and placed midway between costa and margin, which at first rather broadly revolute, and finally relaxed.

Kwangsi.

Species allied to V. caricina Christ, differs in much smaller dimension, blunt apex and shorter sori.

7. Vittaria caricina Christ. Bull. Geogr. Bot. Man. 190, (1904); Matthew 391, (1911).

Rhizomes creeping, elongated, thick as raven's quill, densely clad in atratous filiform, and subulate scales; leaves numerous, seriated on rhizomes, 25 cm. long, 1½ mm. broad, very slender and thin, gradually narrowed downward into a short purplish stipe ½ mm. broad, apex acuminate, costa beneath prominent pale green, impressed above; filling up the space between costa and margin, texture rigid, color

grayish-green, glabrous or scaberous.

Kweichow.

8. Vittaria lineata (L.) Smith, Mem. Acad. Turin. 11 t. 9. fig. 5, (1793) HKBK. 396 (pt.); Christ 53; NPfl. 299.

Pteris lineata L., 1753.
Taeniopsis lineata J. Sm., 1841.
Haplopteris lineata J. Sm., 1866.
Oetosis Lineata Greene, 1900.

Fronds 15-20 cm. long, 3-9 mm. broad, narrowed gradually downwards to a stout compressed stem, which passes into the frond gradually the edge often reflexed, texture firm, a distinct raised midrib running from the base to the apex; vins immersed, parallel, very oblique; sori in a broad slightly intramarginal line in a slighty furrow, the edge of the frond at first wrapped over it.

Peru Brazil, Himalayas, Mascaren Isles, Genuea Coast, Cape Colony, India, Malaya, Japan, China: Kinkiang, Szechwan, - Omei Shan; Kweichow, Hupeh, Kiangsi, Anhwei.

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9. Vittaria modesta Hand.-Mzt. Symb. Sinic. VI. 42, (1929).

Rhizome slender, creeping, long bibrous-rooted, paleae lanceolate, long-subulate, 2-3 mm. long, usually falcate upward, pellucid dense, clathrate, nigro-fuscous, with subulate-subfiliform apex. Frond approximate, from a short naked green stipe ½ mm. thick upward very narrowly linear-lanceolate, 6-12 cm. long, 1-2.5 mm. broad, dark green, apex obtusish, somewhat thickened, very smooth, or the fine costa when dry sulcate above and slightly prominent below. Sori submarginal, as broad as one-third the breadth of the lamina, partly covered by revolute margin, without indusium, rarely finally immersed, often interrupted. Paraphyses numerous, the lower part filiform hyaline and the apex clavate, truncate, ochraceous. Sporangia pale annulus broad, brown, Spores ovate, subhyaline, smooth.

Southwestern Hunan.

Closely allied to V. flexuosa Fee and V. japonica Miq., both of which however, are of larger size, have narrower lax clathrate subulate barbellato-asperous paleae, more prominent costa, narrower sori and much narrower and firmer annulus.

10. Vittaria flexuosa Fee, 3 Mem. 16, (1850-52); Clarke, Ferns N. Ind. 574 Matthew 391, (1911); Copel. Philip. Journ. Sci. iii. V. 282, (1908).

Taeniopsis lineata Bedd., Ferns S. Ind. t. 54.

Rhizomes very shortly creeping, thick as pigenons quill, covered with very narrow, lanceolate, long-acuminate slaty-brown or fuscous scales with serrated margin. Stipes tufted. Frond 4 mm. apart, 30-40 cm. long, 5-8 mm. broad, gradually attenuate to a long striate stipe, stiff, coriaceous, opaque, flexuose, sometimes procumbent at base, margin strongly revolute; the midrib conspicuous, prominently raised beneath even in the upper half of the frond. Sori supra-cuticular, submarginal, sunk in a rather broad channel, the outer lip of the involucre easily distinguishable from the margin of the frond; sporangia rounded, provided with broad- 18-20 articulated annulus; spore reniform, smooth, depressed when dried.

India, China: Kwantung.

Closely allied to V. linata with it was united by some author, the present species has more tufted stipes and less marginal sorial-groove.

11. Vittaria costata Kze, Linn. 9. 77, (1834); Anal.29 t. 18 f. 2, (1837); Matthew 391, (1911).

Vittatia gardneriana Fee., 1851-52; HKBK. 395; NPfl. 299.

Fronds 30 cm. or more long, 6 mm. broad, point acute, the lower part narrowed gradually to the base or a short slender stem; texture thin, the young, fronds transluscent, a slender immersed midrib extending from the base to the apex; veins fine, distinct, oblique; sori in a broad superficial slight intramarginal line, with the edge produced beyond, but not wrapped over it.

Brazial, China: Yunnan.

12. Vittaria suberosa Christ, Bull. Soc. Fr. 52. Mem. I. 12, (1905) Matthew 391, (1911).

Rhizomes short, strong, suberect radicose; leaves fasciulatotufted, nuerous (10 or more), base clothed with setiform atratous very thin hairy-pointed clathrate scales 1 cm. long, scarcely attenuated along the stipes, subsessile, 30-40 cm. long, 3 mm. broad, linear, the upper surface deeply longitudinally bi-furrowed i. e. costa 1½ mm.
(P. 416.).
broad, elevated but plane, margins equally elevated; the lower surface plane not sulcate, costa not elevated; sori submarginal dark-brown, not extending to the apex but over one-half the frond downward ¾ mm. broad, margin very narrow, scarious, not reflexed; texture rigid, coriaceous, color light green, opaque, veins hidden, erect-oblong,

Szechwan.

Tribe XII. Gymnogrammeae

Sori linear or linear-oblong, more than 2 X as long as broad, serveral on each side of the costa, mostly oblique to the latter, or running longitudinally and irregularly along the veins, free, joining or reticulate. Stipes to articulate to the rhizome.

Key to Genera

1. Fronds simple, entire, usually lanceolate; veins copiously anastomosing.
    2. Sori linear, regular; running obliquely to the margin and midrib, and transversally crossing the verticulations..............................70. Loxogramme
    2. Sori linear, irregular, reticulate along the veins; midrib wanting...................71. Antrophyum
1. Frond 1-several pinnate; veins generally free.
    2. At least the fertile fronds coated beneath with a white or yellowish powder.......72. Ceratopteris
    2. Fronds green beneath.
        3. Sori borne on the entire length of the veinlets except the apices.
            4. Venation of the segments flabellate or somewhat many times dichotomous.
                5. Fronds naked..............73. Anogramme
                5. Fronds dense hairy.......74. Gymnopteris
            4. Venation of the segments pinnate; fronds naked...........................75. Coniogramme
        3. Sori borne on the apical part of the veins.....................................76. Notholaenea

70. Loxogramme (Blume) Presl. Tent. Pterid. (1836); Copel. Phil. Journ. Sci. xi. 1. Bot. 43 (1916). (Antrophyllum § Loxogramme Bl.), Fl. Jav. Fil. 73. 1828.

Type: Antrophyum lanceolatum (Sw.) Blume

Sori linear-oblong or linear, oblique forming an acute angle with the costa, rarely subparallel to it; immersed, in the upper part of frond receptacle consisting of the areolae, no indusium. Fronds not articulate (so the main ones when present), anastomosing irregularly to form elongated rectangular, unicual areolae with or without included free veinlets. Rhizomes more or less creeping. (Greek, referring to the oblique linear sori).

Sp. about 20, typically Malayan, extending as far as Africa, Polynesia, Japan, and China, 6 recorded from China.

Key to species

1. Frond long-spathulate, to 7.5 cm. long, 6-8 mm. broad.....................................1. L. grammitoides

1. Frond oblong, to 20 cm. long, 3 cm. broad..................
   ....2. L. duglouxii
1. Frond oblanceolate.
   2. Frond 1-2 cm. broad.
      3. Sori costular, oblong to broadly linear-oblong.
         4. Fronds somewhat dimorphic, below 15 cm. long, apex abruptly acute, midrib flattened beneath..
            ....3. L. chinensis
         4. Fronds uniform, above 15 cm. long, long-acuminate, midrib prominently raised beneath......
            ....4. L. lanceolata
      3. Sori divergent, narrowly linear.....................
         ....5. L. fauriei
   2. Frond more ample, sori broad, divergent.................
      ....6. L. involuta

1. Loxogramme grammitoides (Bak.) C. Chr. Ind. Suppl. II. 21. 1913-1916; Dansk. Bot. Arkiv. 6: 3. 49, pl. III. f. 5. 2-b. 1929.

Gymnogramme grammitoides Baker, JoB. 178, (1889).
Polypodium grammidtoides Diels, Engl. Jahrb. 29. 205, (1900); Matthew 379, (1911).
Gymnogramme lanceolatum var. minor Baker.
Selliguea grammitoides Christ, 1903.
Loxogramme spathulata Copel., Philip. Journ. Sci. Bot. xi: 331. 1926.

Rhizomes slender, wide-creeping, paleae minute, lanceolate, brown; fronds oblanceolate, simple, sessile, subcoriaceous, glabrous, 5-7.5 cm. long, 6-8 mm. broad, narrowed gradually to the base; veins anastomosing copiously in irregular hexagonal areolae; sori confined to the upper third or quarter of the frond, oblique, parallel, 3-4 mm. long, not reaching the edge.

Hupeh, Szechwan, Yunnan.

Loxogramme spathulata Copel. is not specifically different from the present species, except the fronds somewhat dimorphic.

2. Loxogramme duclouxii Christ, Bull. Geogr. Bot. Man. 140, (1907).

Polypodium succulentum C. Chr., Ind. Suppl. 63, (1913).

Rhizomes creeping, much branched and radicose; leaves solitary, or close together, gradually narrow downward and decurrent along the stipes, oblong, 20.cm. long, 3 cm. broad, acuminate, clad at base with opaque gray lanceolate scales 1/3 cm. long midrib dilated towards base, distinct to the apex; sori on the apex of the leaves, i. e. confined to the upper ¼-1/5, close, often contiguous, strongly oblique, extending from costa almost to the margin, 1½ cm. long, 1½ mm. broad, ochrachous, numerous; about 10 or 12 on each side;

texture flaccid, succulent, color light green above, paler below.

Yunnan.

3. Loxogramme chinensis, Ching, Sinensia 1: 14 (1929).

Rhizome wide-creeping, 2-3 mm. thick, scales dark brown, dense, adpressed or subpatent, broad at base, gradually attenuate into a long subulate apex, distinctly clathrate. Stipes non or very short; frond subapproximate, pale green, glabrous throughout, somewhat dimorphic, 5-14 cm. long, to 7 mm. broad in the broadest part, the sterile ones broader (-9 mm. broad) and generally shorter, broadest in the upper one-third, slowly narrowed downward to the base or a short stipe, about 2 mm. broad near the base, apex acute to blunt, margin entire, revolute, somewhat undulate, midrib slender, raised above, flattened or slightly
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grooved below, veins and veinlets hidden: texture coriaceous, but flaccid. Sori oblique to subparallel, more often tending to confluent, not costal, but well extending to the margin, 3-8 mm. long, confined to the upper one-third portion of the frond.

Kwangsi.

Species intermediate between L. lanceolata Presl. and L. spathulata Cope. differs from the former in smaller dimension of somewhat dimorphic frond, non-costal sori well extended to the margin of the frond. and the shape of paleae; from the latter in larger size and much less spathulate frond.

4. Loxogramme lanceolata (Sw.) Presl. Tent. 215, (1836).

Polypodium loxogramme Mett., Pol. 112 n. t. 3. f. 25. (1857). Christ, 107; NPfl. 316; Matthew 380 (1911).
Grammitis lanceolata Sw., 1801.
Selliques lanceolata Fee, 1850-52.
Gymnogramme lanceolata HK., 1864, HKBK. 387.
Gymnogramme abyssinica Baker, 1874, HKBK. 517.

Rhizomes wide-creeping, the scales small, linear, dull-brown; fronds 15-30 cm. long, entire, the lower third narrowed flaccid; both sides naked; veins obscure, the midrib much more slender than in L. involuta, the sori more oblong and falling considerably short of the edge.

Abyssinica, Natal, Polynesia, Japan, Korea, China: Kweichow, Hupeh, Szechwan, Fukien.

5. Loxogramme Fauriei Copel. Philip. Journ. Sci. Bot. 11. 45 t. 3. f. 12, (1916).

Rhizome creeping 1-2 mm. thick, woody, paleas lanceolate acute or acuminate, mostly deciduous, but persistent around the base of the stipe and castaneous; stipes 3-5 cm. long, strong, terete or applanate upward; frond 15-30 cm. long, oblanceolate or linear-oblanceolate, acuminate gradually narrowed downward, coriaceous, glabrous, sometimes subinvolute upon drying; sori erect, imbricate, linear, almost extending to the margin.

The type is recorded from Formosa, differing from Loxogramme lanceolata in the palae being more coriaceous and most conspicuously in the sori.

Japan, Formosa, China: Kwantung.

6. Loxogramme involuta (Don) Presl. Tent. 215, (1836).

Grammites involuta Don, 1825.
Grammites scolopendrinum Bory, Desp. voy. Bot. I. 257 t. 30 f. 1. 1828.
Gymnogramme scolopendrinum HK., 1864, HKBK. 387.
Polypodium scolopendrinum C. Chr., Ind. 60. 1905; 562, 1906; Matthew 382, 1911.

Rhizomes creeping, the scales large, lanceolate, dull-brown; frond 20-30 cm. long, 2.5-5 cm. broad the apex acuminate, the edge entire, the lower part narrowed very gradually to the base or a short broad compressed stem; texture thick, coriaceous but flaccid; both sides naked; areolae obscure, without free veinlets; sori in long parallel very oblique lines reaching from the midrib nearly to the edge.

North India, Ceylon, Solomon Isles, China: Szechwan, Yunnan.

(P. 419).
71. Anthrophyum Kaulfuss, Enum. Fil. 197, (1824).

Type: (Hemionitis plantaginea Cav.).

Sori long-linear, carried along the veins, irregularly longitudinal or subflabellate, superficial or more commonly immersed, free or reticulate but often imperfectly confluent, paraphysis present; inducium wanting. Fronds simple, entire, most oblanceolate, apex acute or blunt, the lower part narrowed gradually to the base or very short stalk, not articulate to the rhizome; texture firm but fleshy; veins copiously anastomosing, forming longitudinal-elongated, more or less hexagonal areolae; costa wanting, at least in the upper half of the frond, rhizomes subcreeping. (Greek, "a cave" and "a cave" and "leaves," alluding possibly to sori in grooved fronds).

A small genus of about 37 closely allied species, almost

all restricted to the tropics of both hemispheres, 70 recorded from Southwestern China.

Key to species

1. Ferns of the habit of Vittaria, frond narrowly linear, below 1.5 cm. broad.
  2. Areolae narrowly linear, rhizomatic scales small............................1. A. vittarioides
  2. Areolae shorter, broader, rhizomatic scales larger (stipes none).............2. A. henryi
1. Ferns not vittarioid in habit, much broader.
  2. Fronds long-petiolate, petiole above 4 cm. long.
    3. Frond oblong-lanceolate or spathulate, below 7 cm. broad.
      4. Frond spathulate, abruptly narrowed into a long acumen 1 and very gradually tapering downward; sori broad, only shallow immersed..........................3. A. petiolatum
      4. Frond oblong-lanceolate, gradually acuminate into a short acutish apex, rather shortly and more suddenly decurrent at base; sori narrow, deep sunk in groove...4. A. plantagineum
    3. Frond broadly obovate or subrounded to 10 cm. broad..........................5. A. latifolium
  2. Frond very shortly stipitate, linear-lanceolate, shortly acuminate towards the apex.
    3. Sori many-rowed and reticulated between the edge and costa
      4. Stipes rather distinct; veins pauci-anastomosing, areolae over 3 cm. long...6. A. reticulatum
      4. Stipes indistinct; veins copiously anastomosing, areolas below 2.5 cm. long..7. A. califolium

1. Anthrophyum Vittarioides Baker, JoB. 267, (1890); NPfl. 301.

Stipes tufted, very short; paleae lanceolate, nearly black. Fronds linear, entire, moderately firm in texture, green and glabrous on both surfaces, 15 cm. long, 0.6-1.3 cm. broad in the middle, narrowed gradually to the base and apex; veins anastomosing into long narrowareolae parallel with the midrib and margin, without any free included veinlets; sori distinctly intramarginal, sunk in a distinct groove sometimes in double rows.

An interesting species intermediate between Vittaria and Anthrophyum.

Tonkin, China: Yunnan - Mentze.

(P. 420).

2. Antrophyum henryi Hieron. Hedwigia LVII. 208, (1915).

Rhizomes short-creeping, with distochous leaves scarcely over ½ cm. apart, subscaly, scales ovate, elongate-deltoid, very acute, clathrata, composed of cells which are polyedric in the lower part but subquadrangulic in the upper, dark castaneous, scarcely over 4 mm. long, 3/4 mm. broad above the base. Leaves linear-oblanceolate, 10-20 cm. long 1-1 cm. broad above the middle, gradually narrowed downward into the short petiole 1-2 mm. broad, shortly or subelongate acuminate towards the apex, when dry grayish-glaucous, subchartaceous, but subcoriaceous when wet, midrib prominent only in the lower part, transverse veinlets anastomosing into to 6 rows of oblong areolas in the upper part, which are about 1-3 cm. long, 1-2 mm. broad slightly prominent on the upper surface when dried, immersed in grooves underneath, visible when hold against light in wet condition. Sori subimmersed in grooves. Sporangia strongly compressed, broad ovate, about 0.2 mm. long, 0.18 mm. broad, shortly stipitate (stipes much shorter than the sporangia), intermixed with paraphyses, which are simple and multicellous, with apical cells 0.3-0.4 mm. long.

Yunnan.

This species is somewhat related with A. reticulatum, from which it differs in much dwarf status, much smaller and fewer rows of areolae, smaller irregular rhizomatic scales composed of fewer rows of cells and much shorter and broader apical cell of the paraphyses. It also doubtless most closely related to A. vittarioides Baker from Tonkin, but differs in shorter areolae, somewhat larger rhizomatic scales which have strongly yellow outer-wall and thicker inner wall, and by much longer apical-cell of the paraphyses. From A. stenophyllum from same locality, the present species differs in much larger and broader leaves, fewer seldom anastomosing veins and less distinct areolae andthepresence of alway more than two sori on the under side of the fronds.

3. Antrophyum petiolatum Baker mss. Christ in Bull. Geogr. Bot. Mans. (1902) 202; Baker in Kew Bull. (1906) 14; Matthew in Journ. Linn. Soc. 39: 342 (1911).

Rhizome short, erect; scales basal, dark brown, linear-subulate, rather dense, membranaceous; leaves several together, stipes naked, green, compressed, 7-14 cm. long; frond obovate-cuneate, long-cuspidate, 10-15 cm. long, 5-6.5 cm. broad, broadest at the upper 2/3 or still higher up; texture carnoso-coriaceous, green and glabrous on both surfaces; vein rather distinct, vertical, rarely anastomosing, areolae narrow,

above 2 cm. long, 3 mm. broad; sori copious, slightly immersed in broad shallow grooves, sometimes jointed at the ends.

Yunnan, Kweichow, Kwangsi.

Nearest to A. plantagineum Klf. yet distinct for its much longer stipe, broadly obovate-cuneate frond with cuspidate apex and much broader, closer sori only superficially immersed in broad shallow grooves. First collected in Yunnan by A. Henry, later in 1898 by Pere Bodinier in Kweichow and recently known from several localities in Kwangsi. As seen in its natural habitat, it generally grows on dripping or shaded rocky cliff by mountain torrents.

4. Anthrophyum plantagineum (Cav.) Klf. Enum. 147, (1824); HKBK. 393; Christ 57; NPfl. 301; Matthew 342, (1911).

Hemionitis plantaginea Cav., 1802.
Antrophyum lessonii Bory., 1828.
Antrophyum angustatum Brack, 1854.

Rhizome short; scales linear-lanceolate, acuminate, brown, whith the margin beset with sharp, short, spreading, distant teeth; stipes distinct, approximate, 2.5-15 cm. long, Fronds 15-23 cm. long, 3.8-5 cm. broad, aputhulate or ovate-lanceolate, broadest at one-third of the way down, the apex acute or acuminate, the margin entire, often slightly thickened, the base narrowed gradually, sometimes more suddenly in the smaller forms; texture more or less coriaceous; no midrib or an indistinct one at the base; sori short or long, deeplysunk, often forked and anastomosing, the edges the grooves more or less raised or not so; paraphyses capitate at the apex.

India, Philippine, Malaya, Ceylon, Formosa, China: Hainan, Yunnan, Kweichow.

Differs from A. petiolatum by rather suddenly / narrowed and almost cuneate base, short gradually acuminate apex, numerous short hexagonal areolae and short narrow distinct (never tending to be confluent) sori sunk in deep grooves.

5. Anthrophyum latifolium Blume, Fl. Jav. Fil. 75, (1828); HKBK. 394; NPfl. 301; Matthew 342, (1911).

Antrophyum boryanium Bl. Fl. Jav. Fil. 75 t. 31, (1828).
Hemionitis latifolia Keys, 1868.
Hemionitis blumeana Presl., 1836.
Ast/rophyllum obovatum Bak., 1898.

Rhizome short-creeping, clothed in subulate small brown dens/te paleae. Stipes 7.6-15 cm. long, stout, compressed, widening into the frond gradually. Fronds 10-15 cm. long, 7.6-10 cm. broad, oblong or obovate-cuneate the apex cuspidate,

the edge entire, or slightly repand towards the apex, the base narrowed very gradually; texture thick; no distinct midrib; areolae vertical, 5-7.6 cm. long, 0.3 cm. broad; sori stout, copious, rarely joining.

N. India, Malesia, Java, Bootan, China: Yunnan.

Differs from A. petiolatum by much more broadly ovate frond by the more sudden contraction at both ends, more copiously short areolae with somewhat narrower and distinct sori.

6. Anthrophyum reticulatum Kaulf, Enum. 198, (1824); HKSK. 393; Christ 57; NPfl. 301; Matthew 342, (1911).

Hemionitis reticulata Forst., Prod. 79, 1786.

Fronds 15-30 cm. long, 3.8-5 cm. broad, broadest about one-third of the way down, the apex blunt or acute, the lower part narrowed gradually to the base or a short compressed stem; midrib scarcely any; areolae several inches long, 2.5-3.8 mm. broad, veinlets very distinctly raised on the upper surface; sori copious, often joining, raised above the surface.

Himalaya, Ceylon, Aneiteum, Queensland, Formosa, China: Yunnan, Hainan.

7. Antrophyum callifolium Bl. in Enum. 111 (1828); Fl. Jav. Fil. 83, t. 35.

Antrophyum flacatum Bl. in Fl. Jav. Fil. 76, t. 32.

Caudes subwoody, creeping, thick as finger, nodulous, ferruginous-hirsute; stipes short or none, flattened often tortuous, scaly at base; fronds tufted, erect 30-40 cm. or more long, rarely subfalcate, acuminate, gradually attenuate at base down and decurrent into the tipe, margin, entire, narrow, flavicante, diaphanous, rarely revolute; texture coriaceous, thick, glabrous, rugose when dried, without distinct
(P. 422).
Midrib, veins distinct, laxly and copiously reticulate into narrow linear hexagonal areolae about 2-2.5 cm. long, soriferous on the under surface; sori multiseriate, linear, subcontinuous, not marginal, the lower part sterile or sparcely soriferous, ferruginous and finally fuscovillose, erect, immersed.

Java, China: Hainan.

8. Anthrophum stenophyllum Baker, Kew Bull. 233, (1898); Matthew 342, (1911); Benedickt, Bull. Torr. Bot. Club. XXXVIII. pl. 7. f. 1-2. (1911).

Rhizomes short-creeping, clothed with ovate-lanceolate black clathrate paleae. Lamina entire, linear, 10-12.5 cm. long, 7.7 cm. broad green on both sides; veins elevated, plicate above, vertical rarely anastomosing; petioles almost none or very short; sori mostly produced towards both apex and base of the lamina.

Yunnan.

72, Ceropteris Link, Fil. Sp. 141, (1841).

Type: Acrostichum calomelanos L.

Sori linear or linear-oblong, running along the veins, not quite reaching their tips, without paraphyses, not inducium. Rhizome commonly short-creeping; stipes not articulate to the rhizome. Fronds divided, at least the fertile ones coated beneath with white or yellow waxy powder; veins free, generally forked or pinnate (Greek, wax fern)

A small genus of about 9 species chiefly confined to tropical America, characterized most conspicuously by having the under surface of the fronds covered with a colored powder, often silver white or bright yellow.

The discovery of this genus in South China is a new record in phytogeography, as it is formerly supposed to be a genus confined to tropical America.

Ceropteris tartara (Cav.) Link, Fil. Sp. 142, (1842).

Gymnogramme tartara Desv., 1811; HKBK. 384.
Neurogramme tartarea Diels, 1899; NPfl. 264.
Hemionitis dealbata Willd., 1809.
Gymnogramme tartarea Presl., 1825.
Allosorus farinosus Kze., 1848.

Stipes tufted, firm, 15-30 cm. long, dark chestnut brown, scaly towards the base. Fronds 30-60 cm. long, 15-30 cm. broad, oblong-deltoid, bipinnatifid; pinnae lanceolate, the lowest the largest, sometimes sharply deflexed; pinnules oblong, obtuse, entire or nearly so, united or the lower free, whether or not toothed; texture subcoriaceous; under surface powdery; powder thick, white.

Tropical America, Hongkong, Kwantung.

New to China.

73. Anogramma Link, Fil. Spec. 137, (1841).

Type: Polypodium leptophyllum L.

Sori linear or linear oblong, simple or forked, terminal or subterminal on the veins, almost occupying the whole length

of the latter, without paraphyses; no inducium. Fronds fasc/eicled, pinnately divided, naked; veins free, flabellato-dichotomous; rhizomes short, stipes not
(P. 423).
articulate to the rhizome.

Sp. 9 widely distributed, most abundent in warm parts of America; the following 2 species recently recorded in China.

Key to species.

I. Fronds ovate-oblong 2-pinnatifid or 2-pinnate on the lower part..........................1. A. makinoi
II. Frond deltoid, 4-pinnatifid.........2. A. microphylla

1. Anogramma makinoi (Maxim.) Christ bull. Geogr. Bot. Mans. XVI. 129, (1905); C. Chr. Ind. 58 (1905).

Gynogramme makinoi Maxim, Makino in Bot. Mag. Tokyo, 8. 481. pl. 9. 1894.

Root fibrous. Rhizome creeping, simple or branching slender, compressed, densely clothed with purple-brown hairs. Stipes distant, erect, slender hairy, 2-5 cm. long. Fronds delicate, herbaceous, ovate-oblong, bi-tripinnatifid, 1 -2 cm. long, 1-1 cm. broad, hairs scattered on both surfaces but denser on the margin; pinnae alternate, erect-patent, ovate, or deltoid-obate, pinnatifid into 2-7 deep obtuse pinnules, of which lower ones are often again slightly lobed; the barren fronds with shorter stipes and broader pinnae than that of the fertile ones. Rachis hairy, winged above. Veins free, one in each ultimate segment, with the clavate intramarginal tip. Sori naked, blackish, becoming brown when dry, oblong on veins and confluent to that of the middle. Sporangia compressed, globose, shortly pedicellate, ring vertical.

Corea, Japan, China: Shensi, Szechwan.

One of the most delicate little species of the genus.

2. Anogramma Microphylla (Hk.) Diels, NPfl. 259, (1899); Matthew 342, (1911).

Gymnogramme microphylla HK., Ic. Pl. T. 916. (1854); HKBK. 383; Christ 66.
Grammitis microphylla Bedd., 1866.

Stipes densely tufted, 5-10 cm. long, slender, fragile, glossy, chestnut brown. Frond 3/.5-7.5 cm. long, 2.5-3.8 cm. broad, deltoid, quadripinnatifid; pinnae close, the lower ones deltoid; pinnules deltoid ultimate divisions under 0.2 cm. long, half as broad; texture pellucido-herbaceous; veins an sori one to each ultimate division, the latter oblong.

India, China: Kweichow.

74. Gymnopteris Bernharki, Schrad. Journ. 1799^1 297.

(Leptochilus Kaulfuss; Dendroglossa Presl.).

Type: Pteris ruffa L.

Soli superficial, non-induciate, linear, continuous, at length effuse; the receptacle contiguous to the costa of the contracted fronds, often occupying nearly the whole undersurface, sometimes double on each side of the costa; veins pinnate from a central costa, the venules compoundly anastomosing, forming irregular areolae, from which proceed free divaricate veinlets, those of the fertile fronds much less developed. Fronds simple pinnatifid or pinnate, rarely bipinnate, dimorphous; the
(P. 424).
fertile much contracted. Rhizomes short, creeping. (Greek, "Naked Fern")

A genus consists of about 14 tropical species mostly with once-pinnate densely hairy fronds, with the sporangia forming long lines along the veins without indusium: the margin of frond, not rolled over as in cheilanthes to which the genus is closely related. 4 are known from China.

Key to species

I. Fronds simply pinnate
  A. Pinnae auriculato-hastate at base subglabrous above...
  ....1. G. delavayi
  B. Pinnae usually rounded at base, densely ferruginous hairy above.............2. G. vestita
II. Frond bipinnate
  A. Plant large, pinnules cordate or subcordate at base...
  ....3. G. bipinnata
  B. Plant smaller, pinnules hastate at the base...........
  ....4. G. sargentii

1. Gymnopteris delavayi (Baker) Underw. Bull. Torr. Cl. 29. 627, (1902); Matthew 379, (1911).

Gymnogramma delavayi Baker, Ann. Bot. 5. 484, 1891; New Ferns 101, (1891).
Neurogramma delavayi Diels, 1899, NPfl. 262.
Notholaena bureaui Christ, 1905.

Rhizomes strong, short-creeping, erect, radicose; leaves densely tufted, numerous; stipes 10 cm. long, like rachis ebeneous-shining, above; lamina 10 cm. long, lanceolate, acuminate, 3½ cm. broad, simple pinnate, pinnae spreading, remote, 10-12 on each side of the rachis, subopposite, subsessile, the lower ones petiolate, 18 mm. long, [illegible] cm. broad, broadly linear, obtuse, often auriculato-subhastate, at the anterior side, rarely the posterior, at the base,

glabrous and opaque above, the lower surface densely clad in lanceolate pellucid reddish-gray scales 1 mm. long with lobated apex; sori longitudinally disposed, between costa and margin, exindisiate, hidden beneath the paleae and so as the texture coriaceous, color obscure.

Yunnan, Szechuan, Hupeh, Shensi, Kansu.

A more slender and less tomentose form of G. vestita, more slender stipes and upper surface of shorter auriculato-subhastate pinnae being only sparsely tomentose or subglabrous; texture much tinner and more flaccid.

2. Gymnopteris vestita (Wall.) Underw. in Bull. Torr. Club. 29: 627 (1902); C. Chr. Ind. 342 (1906); Matthew in Journ. Linn. Soc. 39: 369 (1911).

Grammitis vestita Wall. in List 12 (1828).
Gymnogramma vestita Presl. in Tent. 218 (1838); HK. Ic. Pl. t. 115; HKBK. Syn. Fil. 379; Christ in Farnkraut. Erde 66.
Syngramma vestita Moore in Ind. 44 (1857).
Neurogramme vestita Diels in Nat. Pfl. Fam. I. 4. 262.

Rhizome rather thick, short, obliquely ascending, clothed in dense silk yellow linear-subulate scales; stipes, 7-15 cm. long, wiry but rigid, shining beneous, more or less furfuraceous hairy, the scales at the base densely tufted and similar to those on rhizome; fronds 15-30 cm. long, 3-4 cm. broad, simply pinnate under a larger ovate or cordate-ovate or oblong, entire, often with an auricle at the superior base, bluntish, the lower ones distinctly stalked, the upper subsessile, the middle 2-2.5 cm. long, 7-12 mm. broad; texture with fine velvety
(P. 425).
ferruginous hairs; veins flabellate towards the edge; sori forked on the veins, almost completely hidden in hairs indusium destitute.

Himalayas to China: Yunnan, Szechwan, Shensi, Kansu, Chihli.

Var. bipinnata Christ, Bull. Geog. Bot. Mans 16: 130 (1906).

Large specimens of 35 cm. long, lower pinnae pinnatifid into 1-3 pairs of petiolate pinnules.

Szechwan, Kansu.

3. Gymnopteris bipinnata Christ, Not. Syst. 1. 55. (1909); Matthew 369, (1911).

Gymnogramme delavaya Christ, Nu. Giorn. Bot. Ital. n. s. IV, 17 t. 3 f. 3. (non Baker).
Gymnogramme vestita var. bipinnata Christ.

Rootstocks short, erect, radicose; apex bulboso-incrassate and clothed with brown adpressed hairs 3 mm. long; blades 5-6, fasciculated; stipes thick as raven's quill, rigid, 10-16 cm. long, terete or obtusely angular, and like shining cinnamon-brown more or less flexuous rachis clothed in very thin floccose grayish-brown hairs; fronds lanceolate, broader from the base, 15-25 cm. long, base 3-5 cm. broad, long attenuate towards the apex, terminal pinna diminated, bipinnate; pinnae about 15 on each side, remote, the lower ones 2-3 cm. far apart, subopposite, shortly petiolate, 3 cm. long bi- or tri-jugated with ~~a~~ terminal pinnule; pinn~~u~~ules free, petiolulate; the upper pinnae simple, petiolulate, the uppermost ones sessile, the costa of the lower pinnae slender, teret, reddish; pinnules 1-1.5 cm. long, 7-10 mm. broad, cordate or subcordate, triangular-ovate, acute or obtuse, entire, veins hidden, the upper surface light green, rarely covered with sparce adpressed slender thin fulvescent hairs, the lower surface entirely covered with dense adpressed fulvous hairs; sori confert, linear and confluent; mixed in dense ferruginous hairs; texture softely coriaceous plants discolored.

Yunnan, Shensi Hupeh, Szechwan.

May be a compound form of G. vestita; var. auriculata Franch. is an intermediate form.

4. Gymnopteris sargentii Christ, Bot. Gaz. 51. 355, (1911).

Rhizomes strong, thick, oblique, very densely clad in soft pale rofous scales 0.5 cm. long; stipes subcaespitose, 3- or 4 together, flexuous, thick, rigid, 3 mm. across, rufo-stamineous, 8 cm. long 2-2.5 mm. thick and like costa clad in white-fulvescent tomentum; lamina broadly deltoid-ovate, 20 cm. long, 9 cm. broad, amply bipinnate; pinnae remote about 6 on each side, approximate, deltoid, obtuse, base broadly trilobate-hastate, 7 mm. long, 5 mm. broad, peticlulate; texture rigidly coriaceous, naked and obscure green above, the underside and margin rufo-tomentose and shining green; sori submarginal, confluent.

Szechwan - Hongkong Ting.

A very interesting species, much more divided than the former, copiously bipinnate with small hastate secondary pinnules; the whole plant is smaller than G. bipinnata.

(P. 426).

75. Coniogramme Fee, Gen. Fil 167, (1850-52);
Hieronymus in Hedwigia LVII. 282, (1916).

(Gymnogramme Desv. in part, 1811.
(Dictyogramme Presl.) 1849.

Type: Gymnogramme javanica Bl.

Sori naked, dorsal, linear or linear-oblong, simple or reticulate following the course of free or reticulate inferior or sometimes middle veins. Fronds distichous, simple when young, pinnate or the lower part bipinnate, sometimes ternate (exceedingly rarely tripinnate), texture usually thin herbaceous, light green, smooth; pinnae and pinnules broadly elliptical-lanceolate, distant, glabrous, g/labrous, rarely pubescent, lateral veins parallel, simple or ones to 5 times dichotomously forked, free or subuniform and reticulate. Sporangia beset with free articulate obtuse or sometimes glandular-incrassate paraphyses. Rhizomes creeping, scales lepidopteroid, (Greek, "dust" and "line," alluding to exinduciate sori line).

A genus of 12 more or less closely related species, exclusively confined to Japan, Pacific Islands and warm parts of China, where 7 recorded. Mostly strong medium-sized herbaceous ferns of pleasing light green leaves pinnately divided into few large elliptical lanceolate pinnae and pinnules and thriving best under shades in wooded ravines or rock shrines.

Two well-difined species in this genus were generally recognized, from which Hieronymus segregatedout 12, of which some must be regarded as mere forms of the one or the other.

Key to species

I. Lateral veins usually not anastomosing.
    A. Margin of pinnae entire or wavy (seldom with distinct serrations), broadest at or below the middle..........
    ....1. C. fraxinea
    B. Margin of pinnae with distinct serrations (entire or wavy only at the base or the apex).
        1. Hydathodes distinctly separate from the base base of serratures by one more or less broad band of mesophyll............2. C. robusta
        2. Hydathodes extend as far as or well intrude into the base of serratures.
            a. At most the lowest three (rarely 4) pairs of pinnae pinnate in the large fronds.
                (1) Pinnae glabrous on the under surface.........
                ....3. C. intermedia
                (glabrous form)
                (2) Pinnae more or less beset with articulate hairs underneath.

a! Hydathodes not or not distinctly united with sclerosed marginal band through a bundel of sclerosed cells. The marginal band formed largely of mesophyll.

1' Hairs on the under side of the pinnae stiff, easily fragile, consisting of 2-4 cells.4. C. rosthornia

2' Hairs on the under side of the pinnae not easily fragile, consisting of 3-6 (seldom to 8) cells........................3. C. intermedia (hairy form)

b! Hydathodes always distinctly united with sclerosed marginal band through one thick bundel of sclerosed

(P. 427). cells............5. C. spinulosa

b. More than 4 lowest pairs of pinnae pinnate in the large forms..........6. C. procera

II. Lateral veins usually anastomosing.

A. Lateral veins sparcely anastomosing (particularly those in the upper ¼ of the pinnae are free); furcations up to 3 times spaces between lateral veins beneath clad with short, stiff, sharply pointed hairs..........................7. C. Wilsoni

B. Lateral veins conspiously anastomosing (except those in the apex of the pinnae); furcations up to 5 times; spaces between lateral veins below entirely glabrous................8. C. japonica

1. Coniogramme fraxinea (Don.) Diels, NPfl. 262, (1899); Hieron. Hedwigia LVII. 289, (1916).

Diplazium fraxineum Don, Prod. Fl. Nepal. 12, 1825.
Gymnogramme fraxinea Bedd., Handb. Suppl. 24, 1876.
Syngramme fraxinea Bedd., Handb. 386, 1883.
Neurogramme fraxinea Christ, Farnk. Erde 63, 1897.
Gymnogramme javanica Bl., Enum. 112, 1828; Flor. Jav. Fil. 95 t. 14.
Coniogramme javanica Fee, Gen. Fil. 167 t. 14. E. 1850-52.
Neurosorus javanicus Trev., 1851.
Grammitis caudata Wall., Cat. n. 4, 1828.

Rhizome creeping, bearing distichous leaves, 1-2 cm. far apart, scales elongato-lanceolate, very acute, entire, 8 mm. long, about 2 mm. broad at base. Leaves to 1.5 m. or perhaps more long. Stipes as long as or longer than the leaves, subquadrangular, sulcate above, plano-convex beneath, about 7 mm. thick at base, which is subdensely clad in similar scales, naked upward, avellaneous-ochraceous or somewhat furvous, glabrous, opaque or slightly shining. Rachis similar to the stipes. Lamina ovate or ovate-oblong, to 60 cm. long, 25-30 cm. broad near the base, simply pinnate (in young plants into

3-5 pairs of lateral pinnae under the terminal one) or subpinnate in all full-grown plants. Pinnae 7-8-jugated under the terminal pinna, which often bifid, the lowest pair of pinnae auriculatobifid or ternate or pinnate into 2-3 pairs of pinnules, the second pair simple or ternate or pinnate, the third pair of rarely auriculato-bifid or ternate. They are opposite or subopposite, rarely subalternate, the uppermost ones sessile, sometimes decurrent, the rest petiolulate, (petioles in the lowest pinnae to 2.5 cm. long), base cuneate or subrotundo-cuneate rarely subtruncate or sometimes oblique, ovate-oblong or oblong or linear-oblong, apex gradually or abruptly acuminate into caudiform cuspidate point to 4 cm. long with entire or undulate margin. Margin of the pinnae usually revolute, subentire or slightly undulate, rarely obsolete crenato-serrulate, marginate with a band consisting of several rows of sclerosed cells, about 0.05-0.1 mm. broad. Size of the pinnae quite variable, 20-30 cm. long, 3-6.5 cm. broad. Costa glabrous, somewhat prominently plane or slightly channelled, green as the mesophyll above, stramineous or ochraceous subshining below. Veinlets branch from the costa at angles of 30-60 degrees, with upper part recurved, the uppermost ones cuspidate, once-forked or simple, but the rest mostly dichotomously branched from the base or some distance above the base; apex incrassate and terminated in hydathodes. Hydathodes about 0.25 mm. broad, and about 0.8-1.2 mm. far apart, quite remote from the marginal band; the upper surface sparsely subglanduloso-hirsute on the apces between the hydathodes, other parts and the under surface entirely glabrous. Sori distributed along the upper side of the veins and veinlets, about 1 mm. broad. Sporangia slightly compressed, obovoid, about 0.2 mm. long,
(P. 428).
0.15 cm. broad, stipitate, anullus composed of 13-14 cells paraphyses articulate, formed of 4-6 cells.

West tropical Africa, N. India, Japan, Formosa, Sandwich Islands, Malayas, Ceylon, India, China: Szechwan, Hupeh, Kweichow, Kiangsi, Fukien, Kwantung, Yunnan, Shensi, Manchuria.

Var. coriacea Merr. Enum. Hai Plants in Lingnan Sci. Journ. V. 15, (1927).

Differs from the type in pinnae being rigid and coriaceous.

Hainan (McClure 8518).

The specimen upon which this variety is based is, unfortunately, a sterile one, otherwise it is very distinct from the type.

2. Coniogramme robusta Christ, Bull. Geogr. Bot. Mans. 32. 175, (1909); Hieron. Hedwigia LVII. 295, (1916).

Gymnogramme javanica var. robusta Christ, Bull. Geogr. Bot. Mans 153, 122, (1902); Bull. Soc. Fr. 52. Mem. 55, 1905.

Rhizomes not seen. Lamina ovate, 30-35 cm. long, 20 cm. broad, subcoriaceous, simply pinnate; the lateral pinnae 3-jugated under the terminal one, shortly petiolulate (the petioles in the lowest pinnae about 5 mm. long, the upper ones much shorter), base shortly cuneate or cuneato-subrounded, elongato-oblong, the lowest much the largest to 19 cm. long, 4 cm. broad at the middle. Stipes subquadrangular, sulcate above, plano-convex beneath, dark purplish-castaneous or wine-colored. Rachis similar to the stipes. Pinnae obscurely green above, conspicuously glaucous-green beneath, margin subirregularly or dentato- or crenato-serrate, serratures about 0.15-0.3 mm. high, about 3/4-1½ mm. broad at base, sclerosed marginal band scarcely over 0.05 mm. broad. Costa green as the mesophyll, obsoletely channelled above, semiteret, subdark puplish-castaneous, shining, glabrous below. Lateral veins simple or pinnate, quite prominent in young plants, immersed and visible when hold against light, in matured plant, forming with the costa angles of about 35-45 degrees, slightly retrorse incurved, simple or double or tri-forked, apex incrassate and terminated in hydathodes. Hydathodes obdeltoid or obovate, about 0.5 mm. broad at or below the apex, about 1-1½ mm. far apart, not attingent to the base of nor intrude into the serrature. Sori occupying the upper dorsal side of the veins and veinlet scarcely over ½ mm. broad. Sporangia slightly compressed, obovoid, about 0.22 mm. long, scarcely over 0.18 mm. broad, shortly stipitate, anullus composed of 16-17 cells, paraphyses articulate, formed of 3-4 cells.

Kweichow.

A species characterized by subpurplish-castaneous or wine coloration on the stipes, rachis and the under side of the midrib to some extent, and simply pinnate frond with larger pinnae of coriaceous texture.

3. Coniogramme intermidia Hieron. Hedwigia LVII. 301, (1916).

Rhizomes creeping, bearing distichous leaves about ½-1 cm. apart, scaly. Leaves about 1 m. long. Stipes about half as long., subterete-quadrangular, channelled above, plano-convex below, stramineous-ochraceous or often subferruginous-fulvous or fulvo-castaneous particularly beneath and on the lateral sides, 5 mm. thick at the base. Lamina ovate, the largest to 60 cm. long, 30 cm. broad near the base, subbipinnate in the full-developed plants, with the terminal pinna which sometimes bifid, opposite or subopposite or decidedly alternate, the upper-most sessile or slightly decurrent, the rest are petiolulate (the petioles in the pinnae about 2-2½

cm. long), the lowest pinnae auriculato-
(P. 429).
bifid or ternate or pinnate into 2-3 pairs of pinnules under the terminal one, the lower pinnae approximate, the third pair simple or auriculato-bifid or ternate, the rest are always simple base cuneate or rotundo-cuneate, rarely oblique, lanceolate-oblong or sublinearoblong, ended in a caudiform, serrate or crenato-serrate subacute or abrupt point to 3 cm. long, to 20 cm. long, 3-3½ cm. broad below or at the middle; margin dentato- or subcrenateo-serrate, except the base which is either subentire or crisp-undulate, or subentire or obsoletely crenulato-serrulate, apex acute; the thickened marginal band composed of 2-3 series of sclerosed cells, 0.02-0.03 cm. broad. Costa scarcely prominent, slightly channelled and green above, semiterete, sparcely hirsuto-pubescent or glabrous, ochraceous, subshining beneath; lateral veins branch from the costa at 40-55 degrees, slightly recurved above the base, branched at or some distance from above the base, rarely simple below, the veinlets simple or forked at or above the middle, the ultimate veinlets always simple, apex slightly incrassate, and terminated in hydathodes. Hydathodes narrow, about 1-1.5 mm. broad, about 0.6-1.2 mm. far apart, reaching the base of serrature or usually well into the teeth. Plants sparcely sometimes rarely hirsuto-pubescent or entirely glabrous on the upper side, obscurely green and glabrous beneath. Sori occupying the upper side of the veinlets, about 0.5-0.75 mm. broad, sporangia subcompresso-obovoid, anullus composed of 13-15 cells, paraphyses flexuose or curved, articulate, of 4-5 rarely 7 cells.

India, Japan, China: Shensi, Szechwan, Yunnan, Manchuria, Hunan.

4. Coniogramme rosthorni Heiron. Hedwigia LVII. 307, (1916).

Rhizomes creeping with distichous leaves ½-1 cm. apart, clad in reddish scales. Leaves about 1½ m. long. Stipes shorter or longer than the lamina, unisulcate above, semiterete below, the basal part grayish-rufescent and scaly, stramineous upward or sometimes ferrugino-striate beneath, about 5 mm. thick at the base. Lamina ovate, subbipinnate, 65 cm. long, 30 cm. broad below the middle. Pinnae usually 3-jugated, opposite or subopposite or sometimes alternate in the upper ones, the uppermost shortly petiolulate or sessile or slightly decurrent, the rest distinctly petiolate (the petioles in the lowest pinnae to 4 cm. long, the lowest pinnae ternate or pinnate into 2-4-jugated subopposite or alternate pinnules), base shortly cuneate-subrounded, or sometimes cuneato-truncate, rarely unequal, lanceolate-oblong or ovate, acute or gradually acuminate above the middle, mucronate; texture membranaceous, subglaucous-olive when dried; margin (except the base which is entire or undulate) dentate or serrato-dentate, teeth more or less patent, deltoid or oblique-deltoid, acute, 0.3-0.4 mm. high 0.5-0.1 mm. broad at the base; marginal band whitish,

composed of 2-3 series of subsclerosed cells about 0.05 mm. broad. Pinnae to 17 cm. long, 2-3 cm. broad at or below the middle, hairy or asperulous-hairy on the upper surface, glabrescent or hairy on the costa beneath. Costa glandulolar and obsoletely channelled above, hairy or asperulous-hairy on the lateral sides underneath; lateral veins branch from the costa at 40-45 degrees, slightly retorsed curved, dichotomous from the base, or forked from above the base, veinlets simple or mostly forked from or above the middle, apex incrassate and terminated in hydathodes. Hydathodes narrow, scarcely over 0.15-0.2 mm. broad, 0.5-1 mm. far part, subattingent to or sometimes shortly intrude into the teeth. Sori borne on the upper side of the veins and veinlets with their basal parts remain sterile, scarcely over 1 mm. broad; sporangia compresso-obovate, about 0.25 mm. long, 0.16-0.17 mm. broad below the apex, stipitate, anullus composed of 12-15 cells, paraphyses flexuose, articulate.
(P. 430).

China: Szechwan, Hupeh.

5. Coniogramme spinulosa (Christ) Hieron. Hedwigia LVII. 311, (1916); Hand.-Mzt. Symb. Sinic. VI. 36, (1929).

Gymnogramme javanica var. spinulosa Christ, Bull. Soc. Fr. 52. Mem. 55, 1905.

Rhizomes thick, creeping, scales rigid, dark brown; stipes 20-25 cm. long, sulcate above, convex beneath, stramineous, subshining. Lamina longer than stipes, ovate in outline, usually ternate or pinnate, rarely subbipinnate (the lowest pinnae forked or ternate); lateral pinnae 2-3-jugated with the terminal pinna, ovate or lanceolate-oblong, about 10-15 cm. long, 2-4 cm. broad, repently contracto-acuminate the uppermost sessile, the rest petiolulate (the petioles in the lowest pinnae about 1 cm. long); texture peperaceo-coriaceous, pubescent on the upper side (hairs about 3 mm. long composed of 4-7 cells); margin serrate except the base which is entire, serratures 0.2-0.25 mm. high, 1-17 mm. broad at the base, subentire or slightly undulate, with acutish or obtusish apex; marginal band usually formed of ferrugineo-pellucide or whitish-hyaline sclerosed cells, scarcely over 0.05 mm. broad. Hydathodes incurved upward, compresso-ovoid, or compresso-elliptical, about 0.25-3 mm. broad, well intrude into the serratures and attingent to the margin band, about 0.75-1 mm. far apart. Sori ochraceous, extending from the costa and falling 4-6 mm. short of the margin.

Yunnan.

Differs from C. rosthornia by more serrated margin, undersurface being covered with more rigid hairs, which are consisted of more cells and much thinnertexture of the leaves.

6. Coniogramme procera (Wall.) Fee, 10^{me} Mem. 22, (1865); Hieron.

Hedwigia LVII. 317, (1916); Hand.-Mzt. Symb. Sinic. VI. 35, (1929).

Trammitis procera Wall., Cat. n. 3. 1828.

Rhizome long-creeping, 7-10 mm. thick, with fronds 2-3 cm. far apart. Paleae adpressed, thin, broadly lanceolate, gradually acuminate into a hairpoint, to 5 mm. long, 1 mm. broad, sparcely denticulate, flavido-brown, somewhat shining. Fronds 70-90 cm. long. Stipes sulcate above, and convex below, 30-60 cm. long, pale brown, slightly scaly at the base, naked, glabrous and subshining upward. Lamina subbipinnate. Pinnae 9-12 pairs, ascendingly patent, shortly petiolate in the lower ones, about 4 cm. apart the lower three pairs pinnate with opposite (in the lower ones) or alternate (in the upperones), pinnules, which are 4-6 on each side in the third pair of pinna, all sessile, smaller than those in the first order. The middle pinnae ternate or auriculate (auricles ovate or rounded, about 1-1½ cm. long, 1 cm. broad above the base with the upper or lower base adpressed on the rachis the uppermost pinnae simple. The pinnae truncate or rotundo-truncate at the base, oblong-ovate or oblong, subacute or long-acuminate into crenato-serrate apex 1-2½ cm. long, margin subdentate-serrate, serrature flalcato-deltoid, with hyaline marginal band formed of one row of slightly sclerosed cells, acutish or obtusish about 0.2-0.3 mm. high, 0.5-0.7 mm. broad at the base. Texture membraneous, glabrous on both sides, obscurely olive-green above, semiterete or slightly angular when dry ochraceous or stramineous, subshining, glabrous below; lateral veins extending from the costa at 55-65 degrees of angles, slightly recurved, forked from or above the base, veinlets mostly simple, rarely forked from the middle or near the apex; veinlets slightly incrassate at the apex, terminated in the hydathodes. Hydathodes narrow, 01.-0.15 mm. broad, attingent to the base of serratures or slightly intrude into them and separated by a band of mesophyll about 0.75-1 mm. broad. Sori
(P. 431).
borne on the upper lateral veins and veinlets, about ½ mm. broad. Sporangia obovoid, slightly compressed, shortly stipitate.

Eastern India, China: Yunnan.

7. Coniogramme wilsoni Hieron. Hedwigia LVII. 321, (1916).

Rhizomes creeping, about 4 mm. thick, scaly, scales rufous, elongato-elongato-deltoid, acute, entire, scarcely over 3 mm. long, 1 mm. broad at the base. Stipes 25 cm. long, about 2 mm. thick at the base, subquadrangular, unisulacate above, convex beneath, subfuscent and scaly at the base, subochraceous upward (to 5 cm. high), fulvo-castaneous towards the apex. Lamina ovate, 35 cm. long, 20 cm. broad, subbipinnate, rachis similar to the stipes, green above, ferrugineous or ferrugino-maculate beneath. Lateral

pinnae 3-jugated under the terminal one, the lowest alternate, bifid or ternate, the uppwermost ones sessile, the rest petiolulate (the petioles in the lowest pinnae 1-1½ cm. long), base shortly and narrowly cuneate, or subrounded or subtruncate, oblong or ovate-oblong (particularly in the pinnules), gradually attenuate towards the apex to a long acuminate point about 1-1½ cm. long; margin serrate or (particularly towards the apex) subdentato-serrate, serrature scarcely 0.25 mm. long, 0.75-1 mm. broad at the base with more or less inflexed (not patent) apex, marginate with a marginal band composed of whitish subsclerosed cells, about 0.05 mm. broad. Plants membranceous in texture, the terminal pinna much the largest, about 19 cm. long, 4½ cm. broad below the middle, sparcely subhirsute on both surfaces, obscurely green above, conspicuously glaucous-green beneath; coast sparcely hirsuto-pilose, rather prominent on both sides, green and obsoletely channelled above, subochraceous-green and usually bisulcate beneath lateral veins branch from the costa at 40-45 degrees, slightly recurved, dichotomously 2-4 forked, veins and veinlets not rarely but not constantly anastomosing, the apex of ultimate veinlets incrassate and terminated in hydathodes, which are narrow, scarcely over 0.15 mm. broad, scarcely 1 mm. far apart, with base well indruding into the serratures. Sori borne on the upper side of the veins and veinlets, rarely anastomosing, with the short bases of the veins remaining sterile, scarcely over 0.25 mm. broad. Anullus composed of 13-14 cells.

Hupeh.

Species intermediate between C. rosthornia and C. japonica, but can distinguished from both its distinct hairation, the shape of the pinnae, by often but not constant anstomosation of the veins and veinlets and by its nature of serration.

8. Coniogramme japonica (Thunb.) Diels, NPfl. 262, (1899); Hieron. Hedwigia LVII. 323, (1916).

Hemionitis japonica Thunb., Fl. Jap. 33, 1784.
Gymnogramme japonica Desv., Berl. Mag. v. 305, 1811.
Dyctiogramme japonica Fee, Gen. Fil. 171 t. 15 A. f. 2. 1850-52.

Rhizome creeping with distichous leaves 5-10 mm. apart scaly, about 5 mm. thick, scales elongate-deltoid, very acute at apex, entire, to 3 mm. long, scarcely 1 mm. broad at the base, honey-coloured. Leaves to 1 m. long, stipes as long as or shorter than lamina, semiterete-quadrangular, sulcate above, convex below, 4 mm. thick, scaly at the base, naked or rarely scaly upward, stramineous or ochraceous or sometimes subcastaneous-fulvous above, glabrous. Rachis naked, similar
(P. 432).
to the petiole. Lamina ovate in outline, about ½ m. long,

25-30 cm. broad above the base, ternate or simply pinnate in young plants into 2-3-jugated pinnae under the terminal one, subbipinnate in full-grown plants. Pinnae up to 5-pairs, the lowest pair auriculato-bifid or ternate or pinnate into 2 pairs of lateral pinnules or subpinnate with lateral pinnae on the lower side and 1 on the upper side, opposite or subopposite, the uppermost usually shortly decurrent, the rest are petiolulate (the petioles in the lowest pinnae to 3 cm. long), base cuneate sometimes oblique, ovate-oblong or oblong or linear-oblong, apex subacute or ended in a caudiform apex scarcely 2 cm. long with subundulate-serrulate margin, margin usually revolute, crenato-serrate except the base which, is entire or undulate, serratures about 0.2-0.25 mm. high, 1-2 mm. broad at the base (submucronate in young plants with patent mucrons); marginal band whitish, narrow, composed of 1-3 series of sclerosed cells, scarcely over 0.03 mm. broad. Pinnae quite variable in size, about 25 cm. long, 4 cm. broad below the middle. Costa glabrous, green, slightly channelled above, semiteret, stramineous, sub-shining below; veinlets branch from the costa at 15-25 degrees, slightly recurved above, dichotomous to 5-forked and almost always anastomosing into approximate 1-3 rows of areolae, ultimate veinlets free, incrassate at apex which is terminated in hydathodes. Hydathodes about 1-2 mm. far apart, quite remote from the base of serrature. Plants perfect glabrous on both surfaces, obscurely green on the upper side when dried, conspicuously glauco-green beneath. Sori on upper side of the veins, scarcely [illegible] mm. broad, sporangia compresso-obovoid, 0.25-0.3 mm. thick, anullus composed of 18-19 cells, paraphyses formed of 3-4 cells.

Japan, Formosa, China: Szechwan, Kweichow, Kiangsi, Chekiang, Fukien, Anwhei, Hangchow, Hunan, Hupeh, Kiangsu.

A common fer in shaded ravines.

Characterized by the anastomo~~s~~zation of veins and veinlets and 2-5 times branching of the lateral veins.

76. Notholaena R. Brown, Prod. Fl. N. Holl. 155, (1810).

Type: Acrostichum marantae L.

Sori marginal at first roundish to oblong, terminal on the veins, soon confluent into a continuous monginal or submarginal line, without a distinct inducium but partly covered by the unaltered, usually recurved edge of the frond. Terrestial slender small ferns usually with creeping rootstocks, and clustered stipes, not jointed to the rootstock; the fronds rather small, pinnately compound, glandular, hairy or scaly, the veins free, the ultimate pinnules small, covered usually with whitish waxy powder as a sort of protection from excessive evaporation. (Latin "Spurious" and

"Cloak," which by some is referred to the rudimentary inducia, by others to the woolly covering of the original species).

Species about 54, in the warmer part of the world, 3 recorded in China. The genus differs from Chielanthes only by the absence of distinct inducium and to which is related by intermediate forms.

Key to species.

I. Frond elliptic-lanceolate; pinnae petiolate
   A. Pinnules entire, broadly adnate to the rachis..........
      ....1. N. marantae
   B. Pinnules more or less pinnatifid, narrowed at the
      base and free....................2. N. hirsuta
II. Frond oblong-deltoid pinnae sessile.....................
      ....3. N. chinensis

(P. 433).

1. Notholaena marantae (L.) R. Br. (Prol. Fl. N. Holl. 146, 1810); Journ. de. Bot. appl. I. 92, (1813); HKBK. 371; Christ. 151; NPfl. 274; Matthew 374, (1911).

Acrostichum marantae L., 1753.
Ceterach marantae DC., 1805.
Acrostichum canariense Willd., 1810.
Notholaena canariense Desv., 1827.
Cheilanthes marantae Domin, 1913.

Rhizome woody, the scales dense, fibrillose, bright-ferruginous; stipes strong, wiry, 7.5-15 cm. long, more or less matted; fronds 10-30 cm. long, 3.7-7.5 cm. broad, oblong-lanceolate, bipinnate; pinnae lanceolate, cut down to the rachis into close oblong entire pinnules 2 mm. broad; texture thick, coriaceous; upper surface pale-green, naked, lower and rachis densely coated with lanceolate, bright-ferruginous scales.

Atlantic Island; Mediterrenian Region, Himalaya, China: Szechwan, Yunnan.

2. Notholaena hirsuta (Poir.) Desv. Journ. de Bot. appl. I. 93, (1813); HKBK. 372; NPfl. 274; Matthew 374 (1911).

Acrostichum marantae L., 1753.
Ceterach marantae DC., 1805.
Acrostichum canariense Willd., 1810.
Notholaena canariense Desv., 1827.
Cheilanthes marantae Domin, 1913.

Rhizome woody, the scales dense, fibrillose, bright-ferruginous; stipes strong, wiry, 7.5-15 cm. long, more or less matted; fronds 10-30 cm. long, 3.7-7.5 cm. broad, oblong-lanceolate, bipinnate; pinnae lanceolate, cut down to the rachis into close oblong entire pinnules 2 mm. b/road; tex-

ture thick, coriaceous; upper surface pale green, naked, lower and rachis densely coated with lanceolate, bright-ferruginous scales.

Atlantic Island; Mediterrenian Region, Himalaya, China: Szechwan, Yunnan.

2. Notholaena hirsuta (Poir.) Desv. Journ. de Bot. appl. 1. 93, (1813); HKSK. 372; NPfl. 274; Matthew 374 (1911).

Pteris hirsuta Poir., 1804, Enc. 5. 719 (non Bory 1804).
Cincinalis hirsuta Desv., 1811.
Cheilanthes hirsuta Mett., 1859.
Acrostichum javense Willd., 1810.
Notholaena sulcata Link., 1833.
Cheilanthes sulcata Fee, 1850-52.

Stipes tufted, 7.5-15 cm. long, glossy, dark chestnut brown, slightly villose; fronds 15-23 cm. long, 3.7-7.5 cm. broad, lanceolate-oblong, tri- or quadripinnatifid; lower pinnae 2.5-3.7 cm. apart, subdeltoid, with lanceolate pinnules and oblong blunt entire or slightly lobed segments, 2-4 mm. broad, texture herbaceous; rachis and especially the under side finely villose and glandular; sori brown.

Polynesian Islands, Formosa, Hongkong, China: Hainan.

3. Nothloaena chinensis Baker Gard. Chr. n. s. 14. 494, (1880); HK. Ic. pl. 1826; Christ 152; NPfl. 274.

Rhizomes slender, creeping, clothed in small, castaneous, linear and adpressed scales; stipes slender, 7.5-10 cm. long, castaneous, naked; fronds small 7.5-10 cm. long, oblong deltoid, bipinnate, bright green and parcely pilose above, the lower surface covered with persistent dense whitish-brown tomentum; rachis castaneous, sparcely pilose; pinnae numerous sessile, lanceolate, the lowest ones 16-18 mm. broad, deltoid, unequalateral; lowest pinnules lanceolate, entire, or crenate, veins sunk, hidden, veinlets ascending, spreading, forked; sori small, globular, marginal.

Hupeh - Ichang - Gorge.

Tribe XII. Acrosticheae

Sori indefinite, the sporangia densely crowded over the under surface of the fronds or portions of the under surface or occasionally extending more or less on both sides of the fronds or segments, not rarely becoming narrowly linear when the fertile segments are much contracted. Stipes whether or not articulate to the rhizome. Fronds or segments strongly dimorphous.

Key to Genera

1. Fronds simple, entire or sometimes deeply bifid; the

fertile and sterile fronds distinct.
2. Costa solitary; veins free, or sometimes the apices or bases of the veins united by more or less marginal or costal lines........77. Elaphoglossum
2. Costa palmately branched from the base of the frond; veins copiously anastomosing..78. Cheiropleuria
1. Fronds simply pinnate; the upper pinnae fertile...79. Acrostichum

77. Elaphoglossum Schott. Gen. Fil. et tab. 14, (1834).

Type: Acrostichum conforme Sw.

Sori indefinite; sporangia densely covering the under surface of the fertile fronds. Veins free, simple or forked, or united by a submarginal veinlet or a marginal cartilagineous or decoloured strand; seldom anastomosing; fronds simple, entire, sessile or stipitate, articulate or subarticulate to the rhizome or more generally pseudo-articulate a little above the base, rarely exceedingly different in shape, the fertile somewhat contracted, more or less longer than the sterile and generally sporangiferous over the whole under surface; rhizomes sarmentose, squamose.

Sp. about 365, on rocks or the trunk of trees mostly in the woods of tropical America, Africa and on the islands of South Atlantic Ocean; 4 are known from China.

Key to species.

1. Sterile frond glabrous or only sparsely scaly beneath, texture coriaceous.
2. Rhizome thick, short, stipe of sterile frond short or nearly sessile, clad in large brown membranaceous scales...........................1. E. austro-sinicum
2. Rhizome long-creeping, stipe naked or slightly scaly.
3. Frond glabrous, stipe to 7 cm. long..2. E. conforme
3. Frond sparsely scaly beneath, stipe longer...3. E. fuusopunctatum
1. Sterile frond densely scaly on both sides and margin ciliate, linear-ligulate, texture thinner, long-stipitate.....................4. E. petiolatum

1. Elaphoglossum austro-sinicum Matthew et Christ in Not. Syst. 1: 57 (1909); C. Chr. Ind. Suppl. 41 (1906-13); Matthew in Journ. Linn. Soc. 39: 368 (1911).

Acrostichum austro-sinicum Tutcher, Fl. Kwant. and Hongk. 355 (1912).

(P. 435).
Elaphoglossum parvulum Copel., Phil. Journ. Sci. Bot. C II; 40 (1916).

Rhizome short, thick, densely rooted; leaves 4-6 together, stipes tufted, thick, stout, 3 mm. across, greenish, deeply sulcate above, terete below, 3-6 cm. long, copiously clothed in broad, ovate, membranaceous, entire, scarious light brown, obtuse scales 5 mm. long; sterile frond 15-30 cm. long, 3-3.5 cm. broad at the middle, cultrato-lanceolate, from the middle upward gradually acuminate in an obtuse or blunt apex, long decurrent towards the base, margin entire, thickened, surfaces, particularly the under, densely clothed in small blackish lacerato-dilated scales; costa very broad, plane, 2-3 mm. broad, pale green, lateral veins very oblique, inconspicuous, 2 mm. apart, extending to the thickened margin, mostly simple or forked; texture carnoso-coriaceous, thick, light green above, pale green beneath; fertile fronds somewhat narrower, much shorter than the sterile, stipes 7-10 cm. long; sori dark brown, covered the entire under surface except the midrib and a narrow free margin.

Kwantung, Kwangsi, Fukien.

A very distinct species, characterized by a broad flat midrib, broad thickened margin, thick carnoso-subcoriaceous texture and dense coating of lacerate-dilated brown scales underneath. It was first found by Dr. Matthew in Tai-mo Shan, New Territory, opposite Hongkong, 1907, on shaded granit cliff, and of late has been reported from several localities from Kwangsi. The type specimen of the present species consisting of 3-4 robust sterile leaves represents rather an extrême form.

Elaphoglossum parvulun Copel. based upon Dunn's specimen, No. 3[illegible]21, from Central Fukien, 1905, is not specifically different except of smaller size with somewhat broader leaves, only about half as long as the type. All the specimens from Kwangsi I have examined are mostly intermediates between these two extremes.

2. Elaphoglossum conforme (Sw.) Schott. Gen. ad t. 14, (1834); Christ 33; non 43; NPfl. 332.

Acrostichum conforme Sw., Syn. 10. 192 t. 1806; HKBK. 301 (pt).

Rhizomes woody, wide-creeping, densely clothed with large lanceolate brownish membraneous scales sometime 6 mm. long, 2 mm. broad; stipe 2.5-30 cm. long, firm, erect, stramineous, naked, or slightly scaly; fronds 5-23 cm. long, 1.2-5 cm. broad, the point acute or bluntish, the base cuneate or spathulate, the edge cartilaginous, entire; texture coriaceous;

both sides naked or merely so; veins subparallel usually once forked; barren fronds usually narrower than the fertile ones, the edge inflexed.

Tropical America, Ceylon, Brazil, Sandwich Isles, Samoa, Fiji, Java, Queensland, Himalayas, China: Kwantung, Hongkong.

3. Elaphoglossum fusso-punctatum Christ Bull. Boiss. VI. 867, (1898).

Differs from Elaphoglossum conforme (Sw.) Schott. by smaller size, longer petiole; obtuse frond less attenuate towards base and, particularly, by the under surface regularly covered with minute brown ovato-lanceolate sparce scales.

Perhaps a form of Elaphoglossum conforme.

Kweichow, Yunnan: in mountains south of Red. River.

4. Elaphoglossum petiolatum (Sw.) Urban, Symb. Ant. 4. 61, (1903); Matthew 368, (1911).

Acrostichum petiolatum Sw., Prod. 128, 1788.

(P. 436).
Acrostichum viscosum Sw., 1806; HKBK. 406.
Elaphoglossum viscosum Schott., 1834; Christ 39; Mon. 41, 148; NPfl. 333.
Acrostichum stelligerum Wall., 1829, HKBK. 521.
Acrostichum angustissimum Fee, 1850.
Elaphoglossum yunnanense Baker, Kew Bull. 233, (1898).

Rhizomes woody, short-creeping; scales dense, firm, linear, brown-black; sterile fronds linear-ligulate, 15-23 cm. long, 1.2-1.8 cm. broad, narrowed gradually from the middle to both ends; stipes subtufted, 2.5-10 cm. long, brown, furfuraceous; texture rigidly subcoriaceous; veins distinct, subpatent, moderately close; both sides coated with bright ferruginous minute scales cut to the center into hairs; fertile fronds narrower, with a longer stem.

America, Africa, Tropical Asia, China: Yunnan.

78. Cheiropleuria Presl. Epim. Bot. 189, (1849).

Type: Polypodium bicuspe Blume.

Sori indefinite, covering the whole under surface of the much contracted, nearly linear fertile frond. Rhizome short creeping. Fronds scattered, not articulate to the rhizome, strongly dimorphous; barren ones simple or more generally 2-fid, the lobes sometimes 2-fid again, Venations similar to Dipteris; main-veins dichotomously branched from the base of

the leaves, veinlets anastomosing copiously with included clavate simple or forked veinlets.

A monotypic genus, confined to southeastern Asia, extending to southwestern China.

Cheiropleuria bicuspis (Bl.) Presl. in Epim. 189 (1839); Christ in Farnkraut. Erde 128, fig. 360; Diels in Nat. Pfl. Fam. I. 4. 336, fig. 175. C. Chr. Ind. 181 (1905).

Polypodium bicuspe Bl. in Enum. 125 (1828), Fl. Jav. Fil. t. 78 B.
Anapeusia bicuspis Moore in Ind. XXI (1857).
Acrostichum bicuspe HK. Sp. Fil. 5: 271, Syn. Fil. 421.
Gymnopteris vespertilia HK. in Lond. Journ. Bot. 5: 193, t. 7-8 (1846).
Cheiropleuria vespertilia Presl in Epim. 190 (1849).

Rhizome woody, thick as man's small finger, short-creeping, densely clothed with yellowish silky hairs; stipes several together, those of barren frond 30 cm. or more long, terete below, broadly grooved above, dark stramineous, shining; barren frond 10-15 cm. long and a little less broad, in the entire portion, ovate, rounded at the base, the upper part consisting of 2 broad divaricated deltoid texture thick coriaceous, shining green above, pale below, glabrous on both surfaces; main veins palmate, radiating from the apex of the fronds 15-25 cm. long 1-1.2 cm. broad, ligulate lanceolate, tapering to both ends, simple, with 3 prominent ribs; sori dark brown, densely covered the whole under surface except the midrib and a very narrow free margin, the stipe 45 cm. or longer.

Java, Formosa, Liu-kiu Isles, Philippenes, Sumatra, Japan, China: Kwangsu.

It is interesting to note here that the genus Cheiropleuria was not known from China prior to the National Research Institute Kwangsi Expedition, 1928, when it was discovered by me for the first in N. Kwangsi on the border of Kweichow, in the chink of rather exposed limestone cliff. A very rare fern in the region. Our Chinese plant
(P. 457).
matches Blume's type very well in having bilobed frond. The var. integrifolia Eat. with simple entire ovate-acute or short acuminate barren leaves, common in Formosa, is not yet known in this country.

79. Acrostichum Linne Sp. 2. 1069 (1753).

Type Acrostichum aureum L.

Sporangia not distributed in distinct sori, but densely crowded and covering the whole under surface of the fertile segments, except the midrib, which are either on the same or

on distinct fronds from the barren ones, and usually narrower. Inducium none, fronds large, simply pinnate, the pinnae with a prominent midrib, the veins distinct, freely and uniformly anastomosing in small hexagonal meshes without free veinlets, the upper pinnae in pairs or whole fertile. A very coarse swampy tufted herbaceous ferns from thick suberect rootstocks, the stipes not jointed to root stock. (Greek "tip" and "row," allusion to the upper pinnae bearing the sori).

A genus of 4 species in the tropics of both hemispheres, 1 from China.

Acrostichum aureum L. Sp. 2. 1069 (1753); HKBK. 423; Benth., Fl. Hong. 443, (1861); Matthew 340 (1911).

Chrysodium aureum Mett., 1856.
Acrostichum speciosum Willd. 1810.

Rootstock stout, woody, scaly. Stipes clustered, glabrous, 30-40 cm. long. Fronds 50-200 cm. long, the pinnae oblong, coriaceous, 20-50 cm. long, 4-6 cm. wide, base stipitate, apex obtuse, retuse, sometimes mucronate; fertile upper pinnae somewhat smaller than the lower sterile ones, the lower surface densely covered with the brown sporangia.

Formosa, Hongkong, China: Kwantung.

A common gregareous fern in open b̸lakish swamps in South China, often reaches seven or eight ft. tall.

Family VI. Parkeriaceae

Sporangia dorsal, not gathered in sori, scattered irregularly on the few longitudinal veins of the fertile fronds. Inducium wanting but the margin of the fertile fronds broadly recurved, hardly changed in texture, the edges meeting against the midribs, quite enclosing the capsules when young. Ring vertical, broad, incomplete, short or interrupted by the very short, nearly wanting stalk of the capsule. Stomium transverse. Rhizomes short, erect. Fronds divided, rather dimorphous; veins anastomosing, but more copiously in the barren than in the fertile fronds.

A monotypic genus in Tropics, differing from all other families of Filicineae by its being acquatic in habitat, growing in quite shallow water or even on dry ground in humid regions.

80. Ceratopteris Brongniart, Bull. Soc. Philom, 186, (1821).

Type: acrostichum thalictroides L.

(P. 438).

Sporangia globular, very large, placed on two or three

veins which run down the frond longitudinally and are nearly parallel both with the edge and midrib of the narrow segments of the fertile fronds and loosely covering their under surface; scattered on the receptacles, sessile, with an incomplete or rudimentary ring, opening in 2 valves; inducium continuous, and membraneous, formed of the reflexed margins of the segments like pteris, with two sides meeting against the midrib. Spores roundish, marked with series of concentric rings. Sterile and fertile fronds, distinct, irregularly cut or lobed or pinnate, borne in rosettes, the sterile spreading, deltoid, broad and much shorter, the fertile more erect 2-4 pinnate, with very slender rolled-up pod-like segments (Greek. "horn" and "Fern," alluding to the pod-like fertile segments).

A genus of only 1 species of very scenlent texture in tropical regions of both hemispheres. It is a true aquatic plant among true ferns and grow floating or rooting under water in the mud.

Ceratopteris thaliotroides (L.) Bronyn. Bull. Soc. Philom. 1821. 186 c. tab; Christ 357; NPfl. 342; HKBK. 174.

Acrostichum thaliotroides L., Sp. 2. 1070, 1753.
Parkeria pteriodes HK., 1825.
Ceratopteris parkeri J. Sm., 1841.

Fronds bipinnate, the fertile ones erect, 15-30 cm. high with linear acute segments 1.8-2.5 cm. long; the margins revolute and covering the fructification their whole length; sterile fronds shorter and more spreading, floating, simple or slightly divided when young, bi or tripinnate, with narrow linear segments when mature; the segments cuneate, with 2 or 3 oblong or lanceolate lobes, of soft half-succulent texture; fertile fronds bi or tripinnate; ultimate segments pod-like, veins reticulate; stipes tufted, inflated with large air-cells.

Throughout the tropics in quite water; S. America, W. Indies, Southward to Brazil, W. tropical Africa, tropical Australia, Madagascar, Formosa, Japan, India, Hongkong, China: Fukien, Hainan, Kwantung, Chekiang, Kwangsi.

Family VII. Gleicheniaceae

Sori dorsal, consisting of few (2-12) capsules. Capsules commonly decumbent and placed in a whorl with the receptacle in the center, sessile or short-stalked, surrounded by a horizontal or subhorizontal, complete ring, bursting vertically, Receptacle punctiform. Indusium wanting. Rhizomes mostly creeping. Fronds rarely unbranched, generally dichotomously forked or pinnate and if pinnate, the pinnae or pinnules dichotomous, frequently bearing axillary buds; the leafy portion of the branches commonly pectinate; veins always free.

2 genera, 1. in China. Tropical and extra-tropical in the southern hemisphere.

81. Gleichenia Smith, Mem. Acad. Tur~~n~~in. 5. 419, (1790).

Type: Onoclea Polypodioides Mett.

Sori dorsal, small, globular or dot-like, situated on a lower exterior veinlets of the segments, without inducium; each consists of 2-4 (rarely 5-10) small sessile globular capsule with a transverse ring and opening at the tip in 2 valves. Procumbent or straggling ferns with dichotomous stipes, the ultimate branches bear two pinnae, deeply (P. 439).
Pinnatifid pinnules.

Species about 105, chiefly in tropics and southern temperate zones of both hemispheres, extending into extra-tropical Australia and Africa in dense thickets. 5 are known from China.

A genus characterized by the more or less dichotomous manner of the branching of the fronds, which are usually per~~e~~renial with an axillary bud at the forking, thus new growth are added each year to the previous one. The leaves in some tropical species reach a hieght over 100 ft.

Key to species.

1. Fronds forked; branches pinnate (Diplopterygium).
  2. Ultimate segments linear-subulate with reflexed
    margin, to 1½ mm. broad at base; plant glabrous......
    ....1. G. laevissima
  2. Ultimate segments linear, obtuse, much broader; rachis
    ferruginous-tomentose or scaly.
    3. Stipes, rachis and undersurface of leaves covered
      with broadly oval-lanceolate castaneous brown
      scales..........................2. G. chinensis
    3. Stipes, rachis and undersurface naked or at best
      more or less clothed in chaffy pubescense.........
      ....3. G. glauca
1. Fronds forked; branches dichotomously forked again.
  2. Ultimate segments above 6 mm. broad, margin, margin
    recurvedly cartilaginous or sometimes subundulate....
    ....5. G. linearis

1. Gleichenia laevissima Christ, Bull. Geogr. Bot. Man. 268, (1902) Matthew 369, (1911).

Ample, 1 m. tall, repeatealy dichotomous, very glabrous, superior axis interrupted, scales oval, very acute, eburneous, with entire margin, [illegible] cm. long, coma globose, terminal; ultimate branches 45 cm. long, 20 cm. broad, ovate, attenuated on both sides, apex caudate, bipinnate; pinnae about 25 on each side with broad rachis; rachis thick as a goose's quill,

straw-fulvous, nitid, sulcate above; pinnae subsessile, the middle ones the longest (12 cm.), the lower ones shortened, 6 cm. long, 1-2 cm. broad, costa naked, caudate; pinnules with broad base and slightly decurrent adnate to the costa, entire, linear-subulate, 1 cm. long, base 1½ mm. broad, nitid, falcato-pectinate, about 36 on surface subcaesious, the upper light green; veinlets numerous, forked at the base; sori medial, very minute, punctiform, scarce, of 3-5 white sporangia.

China: Kweichow, Yunnan, Chekiang, Fukien, Anhwei - Wang shan.

Recently recorded in Luzon.

2. Gleichenia chinensis Ros. Fedde Repert. 13, 120, (1914).

Leaves ample, 7-8 m. long, light green above, glaucescent below, coriaceous, subglabrous, 1-furcate, branches pinnato-pinnatifid; the primary pinnae elongate-lanceolate, about 1-2 m. long, 30-40 cm. broad, pinnate; secondary pinnae numerous, alternate, erect-patent or incurved, linear-lanceolate, acuminate, to 25 cm. long, 3 cm. wide profoundly pinnatifid; segments erect-patent or the upper ones suberect, linear, obtuse, apex produced, to 12 mm. long, 2 mm. broad at the middle, glabrous above, slightly tomentose below, base subequal; stipes and rachis terete, olive-green, densely clad in paleae which are membranaceous, pale ferruginous, linear-lanceolate, densely ciliate, to ½ cm. long, scarcely 1 mm. broad, patent, at last subnaked and slightly asperulous above;
(P. 440).
above; buds clad in very dense similar paleae, pinnato-pinnatifid, about 3-4 cm. long, primary costa subterete, slightly bilinear, olive-green covered in similar but smaller and long ciliat, minutely dense ciliato-dilacerate paleae; secondary costa minutely paleolous and covered by ciliato-dilacerate stellate hairy tomentum above, the lower surface like veins and parachyma clad in similar red paleae, become almost naked at last, stramineous, glabrous, shining, lateral veins profusely furcate, prominent below; sori composed of 3 rarely 4 sporangia.

Kweichow: Pin-fa.

The closely allied G. glauca var. arachnoides Mett. can be easily distinguished by its rachis and stipes covered with broadly oval lanceolate rough castaneous brown scales quite thick coating of felt-like hairs and broad lanceolate scales on the undersurface of the leaves and the more deeply-cut secondary pinnae and the entire apex of the segments.

3. Gleichenia glauca (Thunb.), HK. Sp. 1. 4 t. 3 B. (1868);
Christ 340; NPfl. 353; Matthew 368, (1911).

Polypodium glauca Thunb., 1783; Houtt. Nat. Hist. 14. 177, 1783; Thunb. Fl. Jap. 338, 1784.
Gleichenia longissima Blume, 1828; [illegible] 12.
Gleichenia gigantea Wall., 1828.
Mertensia arachnoides Hassk., 1855.

Large, often many feet long; stipes stout, forked, bipinnate branches very long, bearing numerous, close-placed pinnae 10-20 cm. long, 2.5-5 cm. broad, deeply pinnatifid to the rachis; the segments linear, acuminate, or oblong obtuse, paler or more or less glaucous beneath, glabrous, or densely ferrugineo-tomentose on the rachis and young shoots (especially in the forms from high elevation), very paleaceous on the stipe otherwise the leave and rachis are glabrous. Sori consisting of 3-5 capsules, often mixed with hairs. Rhizomes long-creeping.

Mexico, Japan, Bengal, Malay, West Indies, China: Szechwan, Kweichow, Kiangsi, Formosa, Hongkong, Yunnan, Chekiang, Hunan.

A common gregarious tall fern in warmer parts of China, mostly very glaucous on the under surface of the leaves.

4. Gleichenia splendida Hand.-Mzt. Sitzsanz. Ak. Wien. 61, (1924); Symb. Sinic. VI. 16, (1929).

Rhizome long-creeping, epaleaceous, except the gemmae and the nodes which are sometimes brown-setaceous. Stipes geniculato-erect, 45-60 cm. long, brown shining, terete, 2-3 mm. thick below, plano-convex, paler upward and so as the rachis, twice, rarely once, dichotomous and often springing from the primary wing or sometimes the secondary wing of the gemmae, which are covered with castaneous articulate hairs, with two broadly triangular-ovate, pinnules lobed below, the rest are similar to the pinnules of the fronds. Secondary stipes erecto-patent, 5-8 cm. long, naked. Pinnae sessile, falcato-preasing-patent, 12-15 cm. long, lanceolate-linear unequal at the base, 4-9.5 cm. broad, texture rather rigid, shining green above, conspicuously glaucous beneath when young, but slightly glaucescent in the matured leaves, pinnatifid almost down to the costa; pinnules linear, subcontiguous, rather patent, 6-8 mm. broad, irregularly unequally long, the lower acroscopic ones dimidiated, apex slightly angulato-rotundate, margin slightly recurvedly cartilaginous, sometimes subundulate; lateral veins opposite, 2 mm. far apart, ascendingly forward, branching at about 60 degrees from the costule, the anterior ones sometimes bifurcate from the base, the posterior ones 1-2 (-3) branched, prominent, rigid, finally stramineous.

(P. 441).
Sori borne on the anterior veinlets, scarcely 1 mm. in diameter, brown.

Northwestern Yunnan.

5. Gleichenia linearis (Burm.) Clarke, Tr. Linn. Soc. II. Bot. i. 428, (1880); Matthew 568, (1911).

Polypodium dichotomum Thunb. 1784.
Polypodium linearis Burm., Fl. Ind. 235 t. 67. f. 2. 1768.
Gleichenia dichotoma Hooker, 1844, HKBK. 15.
Mertensia rufinervia Mart., 1834.
Mertensia emarginata Brack., 1854.
Gleichenia rigida J. Sm., 1841.

Stipes terete, zigzag, repeatedly bi- or trichotomous, the ultimate branches bearing a pair of forked sessile pinnae; a distinct pair of pinnae also arises from the base of the forked branches (not of the fronds), pinnae lanceolate, more or less falcate, often 20- or 25 cm. long, pinnatifid almost to the midrib. Segment of lobes nuermous linear, obtuse or emarginate, often 2.5 cm. long, rigid, glabrous or nearly so, but conspiously glaucous beneath, the lowest pair often longest, pinnatifid.

A cospopolitan fern in tropical and subtropical region of both hemispheres, variable in the size of pinnae, shape of the segment and in the texture of fronds, but the pairs of accessory pinnae at the base of a fork are invariably present.

India, Japan, Philippines, Malaya, Formosa, Hongkong, China: Kweichow, Szechwan, Hoinan, Kwantung, Kiangsi, Hunan, Chekiang, Kiangsu, Fukien, Yunnan.

Var. longicauda Christ, Bull. Boiss. VII. 19, (1899).

Differs from the type in much more elongated stipes (30-40 cm. long) frond reduced to 14 cm. long, 20 cm. broad, flabellately to dichotomously branched, the base of the pinnae appendicularly sessile with four almost equal-long principal pinnae having a petiole 2½ cm. long; lobes not at all decurrent but broadened at base and margin crenate, pinnae 3 cm. broad, lanceolate-acute, costa clad in furfuraceous reddish scales; the lamina glaucous beneath, lobes narrowly linear, 2 mm. broad with rather broad pectinate interstices. Sorus of 3 sporangia, pale, small.

Family VIII. Schizaeaceae

Sporangia borne in double rows on narrow specialized segments or ordinary leaves or wholly on specialized leaves, ovoid, sessile, naked or indusiate, provided with a complete transverse apical ring, opening vertically by a longitudinal slit. Rhizome creeping or erect. Fronds dimorphous, the fertile much contracted, the sterile tufted and linear

(Schizaea) or resembling a twining aerial stem with dichotomous or alternate-paired palmately-lobed leaves (Lygodium.) Prothallia green.

4 or more genera in Tropics and Subtropics, I from China.

(P. 442).

82. Lygodium Swartz, Schrad. Journ. 1800^{2}. 105, (1801).

Type: Ophioglossum flexuosum L.

Sori oblong or linear forming spikes either on separate pinnae or in lax rows along the edge of leafy ones, covering the under side of the small lobes which either protrude from the margin of the frond segments or from distinct parts of the fronds, each sorus divided into 2 rows of compartments each containing single spore-case and covered by a brack-like inducium; spore-case transversely oblong, opening by a longitudinal slit, the upper end turned downward and marked with longitudinal striae. Climbing ferns, fronds dimorphous, pinnately or dichotomously divided, inserted, inserted on main stems or branches, in divaricate pairs, usually on a very short common petiole. (Greek "twinning")

A small genus of about 36 tropical and subtropical species, characterized by twinning vein-like frond-rachises with sporangia borne singly under imbricating scales on the under surface of the reduced portions of the fronds. Very ornamental for its climbing habit.

Key to the species

I. Veins free (Eulygodium).
  A. Pinnae dichotomous of palmate lobed..................
      ....1. L. circinnatum
  B. Pinnae pinnate.
    1. Ultimate pinnules articulate to stalk.............
        ....2. L. scandens
    2. Ultimate pinnate not articulate to stalk.
      a. Fertile fronds Not more compound than sterile.
        (1) Ultimate pinnules regularly pinnately
              lobed...................3. L. polystachyum
        (2) Ultimate pinnules not regularly pinnately
              lobed...................4. L. flexuosum
      b. Fertile fronds more compound than sterile........
          ....5. L. japonicum
II. Veins anastomosing (Hydroglossum) Habit of L. circinnatum...............................6. L. subareolatum

1. Lygodium circinatum (Burnm.) Sw. Syn. 153, (1806); Prantl. Schiz. 64; Christ 333; NPfl. 366; Matthew 372, (1911).

Ophioglossum circinatum Burm., Fl. Ind. 228, 1768.
Ophioglossum pedatum Burm., 1768.
Hydroglossum circinnatum Willd., 1802.

Ugena macrostachya Cav., 1801.
Lygodium dichotomum Sw., 1806, HKBK. 437.
Hydroglossum dichotomum Sw., 1801 (pt.).

Primary petiole so much reduced that the fork seems almost to spring from main rachis, secondary 2.5-5 cm. long, firm, naked; pinnules digitate, with 5-6 lobes reaching nearly down to the base or once or even twice forked; ultimate barren segments 10-20 or even 30 cm. long, 1.2-1.8 cm. broad; the fertile ones contracted, sometimes so much that the lamina is nearly lost; the spikes 2-4 mm. long, in/ close marginal rows. Texture coriaceous; stems climb to a great height, frond perfectly glabrous.

Chusan, Philippines, Ceylon, Malaya, Hongkong, China: Kwantung.

Differs from its all Chinese relatives by the barren fronds when fully developed, being palmate or dichotomous/ly forked.

(P. 445).
2. Lygodium scandens (L.) Sw. Schrad. Journ. 1800^{2}. 106, (1801); HKBK. 437; Prantl. Schiz. 61; Christ 354; H.Fl. 366; Matthew 372, (1911).

Ophioglossum scandens L., 1763.
Odontopteris scandens Bernh., 1801.
Hydroglossum scandens Willd., 1809.

Primary petiole very short, secondary 6-12 mm. long, pinnae 10-20 cm. long, 5-10 cm. broad, with a terminal segment and 4-5 on each side, which are very variable in shape, usually simple, ovate or ligulate-oblong, with a rounded or cordate base, sometimes hastate or even slightly pinnate below, always articulated on a slightly thickening of the apex of the petiolute, which persists on spreading from the common rachis at right angle; texture firm; surfaces naked or nearly so; spikes 2-8 mm. long, in close rows along the edge of segments. Fully-developed barren pinnae are pinnate not palmate as in L. circinatum.

Himalaya, Queensland, Ceylon, Malayan Peninsula and Isles, Formosa Hongkong, China: Kweichow, Hainan, Kwantung.

3. Lygodium polystachyum Wall. List n. 177, (1828); Moore Gard. Chr. 671. (1859); HKBK. 438, Christ 671.

Lygodium pinnatifidum Prantl., Schiz. 63. 1881; H.Fl. 366 (Sw. 1803, pt.).

Stems extensively creeping 15 m. tall, densely pilose. Barr-branches almost obsolete, with a small scaly terminal bud; frond conjugate, pinnate, membranaceous; pinnae petiolate, oblong lanceolate, about 25 cm. long, rachis pilose,

pinnate; pinnules short-stalked, 3-5 cm. long deltoid-ovate to lanceolate, glandular-pilose on the costa and veins, pinnatifid more than halfway to the costa into oblong rounded segments, costa of the pinnae and costules of segments flexuose, veinlets simple or forked, fertile segments contracted, each to one spike, spike green to 3 mm. long.

Tenasserim, Malay, Birma, China: Kweichow, Yunnan, Kwangsi.

This is typically a Malayan fern not know in China until 1915 when Dr. Handel-Mazzetti discovered it in South Yunnan near the border of Tonkin, made known. In the summer, 1928, the author found it in S. W. Kwangsi.

4. Lygodium flexuosum (L.) Sw. Schrad. Journ. 1800^{2}. 106, (1801); Syn. 153. (1806); Prantl. Schiz. 72; Christ 355; NPfl. 366; Matthew 572, (1911).

Ophioglossum flexuosum L., 1753.
Hydroglossum pinnatifidum Willd., 1802.
Lygodium semihastatum Desv., 1827; HKBK. 437.
Lygodium serrulatum Bl., 1828.
Lygodium pinnatifidum Sw., 1803; HKBK. 438 (pt.).

Primary petiole none or very short, secondary often 2.5 cm. long; pinnae 20-30 cm. long, 15-30 cm. broad, with a ligulate-oblong terminal segment, 7.5-15 cm. long, 1.2-1.8 cm. broad, and 6-8 similar ones on each side, usually rounded or cordate, all articulated at the base, the lower ones, or all, short-stalked and sometimes hastate or pinnate below; texture subcoriaceous or rather thin herbaceous; rachis and surfaces naked or slightly pubescent; spikes 2-6 mm. long, in close rows along the margin of the leafy segments.

Himalayas, South India, Ceylon, Angola, Philippines, China: Yunnan, Kwantung.

5. Lygodium japonicum (Thunb.) Sw. Schrad. Journ. 1800^{2}. 106, (1801);
(P. 444).
HKBK. 439; Prantl. Schiz. 68; Christ 356; NPfl. 366; Matthew 572, (1911).

Ophioglossum japonicum Thunb., Fl. Jap. 328, 1784.
Lygodium tenue Blume, 1828.
Hydroglossum japonicum Willd., 1802.
Lygodium microstachyum Desv., Berl. Mag. 5: 308. 1811.
Lygodium pubescens Klf., 1824.

A rather slender tall climber to 1-4 m. high; but usually pubescent, at least on the petioles and rachis. Fronds once or twice pinnate, the segments always continuous with and more or less decurrent on the petiolule, but otherwise

exceedingly variable in shape, the terminal segment usually pinnatifid or hastate, the lateral ones 2-3 on each side, very unequal, not articulated at the base, the lower ones long-stalked and pinnate in the lower part, the divisions entire or crenulate; texture herbaceous. The fertile segments usually at least twice pinnate with small ovate or lanceolate lobes. Spikes 2-4 mm. long, either protrude from the margin or occupying the whole under surface, the segments being thus divided to the base into small narrow lobes.

Japan, Ceylon, Java, Philippines, Loochoo Isles, Hongkong, China: Hainan, Kwantung, Shensi, Kansu, Szechwan, Hupeh, Kiangsi, Kiangsu, Chekiang, Fukien, Yunnan.

6. Lygodium subareolatum Christ, Bull. Geogr. Bot. Man. 181, (1906); Matthew 372, (1911).

Widely scandent fern; primordial leaves palmate-pedate, flabellate 35 cm. long and broad, base bifurcate, connate and deeply lobed, lobes 20 cm. long, 3 cm. broad, lanceolate, rather obtuse, serrulato-crenate, rachis and costa dark stramineous, veins conspicuous, anastomosing along costa in three rows of areolae 8 mm. long, narrowly acuminate, veinlets free only towards margin; fertile pinnae petiolate, petiole 6 cm. long, rigid, the base of pinnae dichotomously lobed, pinnules shortly petiolate, bi- or trifurcate, palmate, base broadly connate, obtusely auriculated on the posterior side, to 40 cm. long, 2 cm. broad, linear, costa prominent, veins close, most often bi- or trifurcate areolate either along the costa or in the middle; spicate lobes numerous, densely ciliate, spikes 3 mm. long, obtuse, dark brown, texture coriaceous, color light green, sublucente, both surfaces.

Kweichow.

This species is remarkable for its tendency to anastomosy, which is more strong in the primordial leaves than in the fertile and which is frequently seen in L. heterodoxum Kze of Central America. This is the only Asiatic species of the genus which shows such a phenomena; the all other allies are with free veins. In habit, it resembles L. circinatum Sw., but differs in the fertile pinnae being not reduced.

Family IX. Osmundaceae

Sori dorsal (on the under surface of normal segments) or lateral (on the margin of much contracted fertile segments). Sporangia naked large, globose, mostly stalked, provided with a very short, incomplete horizontal ring often consisting of a few thickened cells only opening in 2-valves by a vertical slit. Prothallia green. Tall leafy terres-

trial, rarely arborescent plants, with thick creeping or suberect caudex. Stipes dilated at the base, not articulate to the caudex. Fronds large, at least simply pinnate, covered with a thick tomentum of long woolly
(P. 445).
hairs when young, at length naked; veins free.

3 genera, generally inhabiting Temperate Regions, only Osmunda known from China.

83. Osunda Linne (Gen. Pl. ed. II, 502),

Spec. Plant. 2. 1066, (1753).

Type: Osmunda regalis L.

(P. 445).
hairs when young, at length naked; veins free.

3 genera, generally inhabiting Temperate Regions, only Osmunda known from China.

83. Osunda Linne (Gen. Pl. ed. I, 502),

Spec. Plant. 2. 1066, (1753)

Type: Osmunda regalis L.

Fertile fronds or fertile portions of the frond destilute of chlorophyll, very much contracted, and bearing on the margins of the narrow rachis-like divisions short-pedicelled and naked sporangia, which are globular, thin, and reticulated, large and oppening by a longitudinal cleft across the apex into two valves and bearing near the apex a small patch of thickened oblong cells, the rudiment of a transverse ring; fronds leafy, herbaceous, large, tall, upright, growing in large crowns from thickened under-ground rootstocks, once or twice pinnate, veins forking or free. Spores green, inducium none. (Osmunder, a Saxon name of the Celtic divinity).

A small genus of about 10 species clearly marked by its habit confined to the North Temperate Zones, only one species known in south temperate region, 8 recorded in China. The sporangia are formed in panicles borne on the veins of reduced leaves.

Key to species

1. Sterile fronds bipinnate (Euosmunda)
   2. Pinnules not acute at the base.
      3. Pinnules oblong or lanceolate not adnate..............
         ....1. O. regalis
      3. Pinnules short ovate-oblong or almost rounded,
         mostly adnate...................2. O. mildei
   2. Pinnules acute at base...............3. O. lancea

1. Sterile fronds deeply bipinnatifid (Osmundastrum)
  2. Fertile and sterile fronds distinct........................
     ....4. O. cinnamomea
  2. Fertile and sterile pinnules on same frond...............
     ....5. O. claytoniana
1. Sterile pinnae not deeply pinnatifid (Plenasium)
  2. Pinnae narrowly linear...............O. bromelliifolia
  2. Pinnae lanceolate or linear-lanceolate
    3. Pinnae with salient teeth......6. O. banksiifolia
    3. Pinnae with adpressed teeth or entire.
      4. Larger pinnae more than 25 cm. long.................
         ....7. O. javanica
      4. Larger pinnae less than 20 cm. long.................
         ....8. O. vachellii

1. Osmunda regalis Linn. Sp. 2. 1065, (1753); HKBK. 427; Christ 332, NPfl. 380; Matthew 375, (1911).

Osmunda glaucescens Link., 1833.
Osmunda spectabilis Willd., 1810.
Osmunda palustris Schrad., 1824.
Osmunda japonica Thunb., 1784.
Osmundastrum japonicum Presl., 1818.

Fronds twice pinnate, 45-90 cm. high or oftent taller, quite glabrous, and pale green; sterile pinnules 13-25, varying from oblong oval to lanceolate-oblong, 2.5-5 cm. long, finally serrulate especially towards the apex, otherwise entire or crenately lobed, towards the rounded, oblique and truncate or even cordate and semi-auriculate base sessile or short-stalked; the fertile segments racemose-panicled, linear, 1.2-2.5 cm. long, on separate fronds from the barren ones or formed at the summit of the sterile fronds.

Canada, America, Mexico, Rio Janeiro, Sweden, Japan, Cochin-China, Himalaya, Cape Colony, Hongkong, China: Chekiang, Anhwei, Fukien, Hunan Kweichow, Yunnan, Szechwan.

var. japonica Thunb. Cop. Ferns Malay Asia. Region 15, t. 11. (1909).

Usually smaller than the type, sterile and fertile fronds distinct the sterile pinnules gradually narrowed upward from a broad base.

A cosmoplitan fern, from Malaya, Japan, India to China: Fukien, Kwangtung, Kwangsi, Kiangsu - I-shing.

2. Osmunda mildei C. Chr. Ind. 474, (1905); Matthew 375, (1911).

Osmunda bipinnata Hooker, Fil. Exot. t. 9, (1857); HKBK. 426; NPfl. 380.

Stems tufted, 30 cm. or more long, rather glossy, stramineous; fronds 45-60 cm. long, 15-25 cm. broad, glabrous, bipinnate, texture coriaceous, the large sterile primary pinnae attaining 10 cm. in length with a terminal oblong or lanceolate one full twice as long, the upper pinnae passing into the segments of the simply pinnate summit of the frond. Fertile pinnae below the sterile ones with several linear or cylindrical pinnules on each side, 6-9 mm. long, 3.7-5 apart, rachis smooth.

Hongkong, China: Kwantung.

3. Osmunda lancea Thunb. Fl. Jap. 330, (1784); [illegible]. 427;
    NPfl. 380.

    Osmunda japonica Houtt., 1786.
    Osmundastrum lancea Presl., 1846.

Sterile and fertile fronds distinct, the former about 30 cm. long oblong, shortly acuminate; pinnae oblong-acuminate, about 12.5 cm. long, stalked, the lowest rather reduced; pinnules narrowly lanceolate, 4.5 cm. long, 6 mm. broad, narrowed at both ends, sessile, distinct, slightly toothed upwards of subcoriaceous texture, surfaces naked; fertile fronds ternato-decompound.

Canada, Swiden, Siberia, Japan, Himalayas, Cape Colony, Cochinchina, Hongkong, China: Chekiang, Kiangsi - Kuling.

Differs from Osmunda regalis var. japonica by the sterile pinnules being 3.5-4 cm. long, at most 7 mm. broad, acute at both ends, serrulate only above the middle and borne on stalks 1-3 mm. long.

4. Osmunda cinnamomea L. Sp. Pl. 1066, (1753); [illegible]. 426; Chr.
    332; NPfl. 379; Matthew 375, (1911).

Struthiopteris cinnamomea Bernh., 1801.
Osmundastrum cinnamomea Presl., 1846.
Osmunda imbricata Kze., 1849.

Stipes densely tufted, 30-60 cm. high, the barren and fertile ones distinct, the young plants densely clothed with ferruginous woolly tomentum; barren fronds simply pinnate, naked when matured, stipe 30-45 cm. long, the fronds 30-90 cm. long 20-23 cm. broad; pinnae 2 pairs or more, opposite, almost horizontally patent close, ligulate-lanceolate, 7.5-10 cm. long, 1.8-2.5 cm. broad, cut down nearly to the rachis into close entire blunt oblong lobes; texture subcoriaceous; fertile fronds much smaller, the pinnae lanceolate, with close dense cylindrical pinnules.

Canada, Newfoundland, Mexico, West Indies, New Grenada, Japan, China: Manchuria, Amurland, Yunnan, Fukien, Kweichow, Hunan.

(P. 447).

Var. forkiense Cop. Ferns. Malay. Asia Region 16 in Journ. Sci. Philip. Bot. IV. 1, (1909).

Frond less than 1 m. high including stipe, about 10 cm. broad, when very young ciliate, especially in the sinuses, otherwise practically glabrous, texture coriaceous; segments almost straight, oblong, rounded at apex.

Fukien.

5. Osmunda claytoniana L. Sp. 2. 1066, (1753); H.Bk. 426: Chr. 383; HPfl. 380; Matthew 575, (1911).

Osmunda interrupta Michx., 1803.
Plenasium claytonianum Presl, 1848.
Struthiopteris claytoniana Bernth., 1801.

Stipes tufted, 30 cm. or more long, clothed with loose woolly ferruginous tomentum when young, naked when matured; fronds 30-60 cm. long, 20-30 cm. broad, the upper, central or lower pinnae fertile; barren pinnae lanceolate, 10-15 cm. long, or more broad, cut down nearly to the rachis into close oblong entire lobes; texture herbaceous; fertile pinnae similar but shorter; pinnules dense, cylindrical.

Canada, Newfoundland, America, Himalaya, China: Szechwan, Yunnan.

6. Osmunda banksiifolia (Presl.) Kuhn, Ann. Lugd. Bat. 4. 296, (1867); Matthew 575, (1911).

Nephrodium banksiifolia Presl, Rel. Haenk. I. 34, (1825).
Plenasium banksiifolia Presl., 1836.
Osmunda presliana J. Sm., 1841. HPfl. 379.
Osmunda javanica pt. HK., H.Bk. 426.

Caudex sometimes 60 cm. high and 15 cm. thick, stipes stout; fronds including stipe 1.52 m. long; pinnae up to 35 cm. long and over 1.4-1.9 cm. broad, short-stalked, acuminate, acute at base, serrate with prominent teeth about 5 mm. long and 15-3 mm. deep; veinlets mostly forked; fertile pinnae basal, considerably shorter than the sterile, pinnate, and the pinnules lobed.

Philippines, Moluccas, Japan, Formosa, China: Fukien, Chekiang.

Two specimens No. 1024, 835. in Tsoong's herbarium collected in Yung Sur Chi, Chon Hui Hsien, S. Chekiang, March the description well, except with broader pinnae (2.5 cm. broad or broader in the broadest part), denser and sharply ascending triangular teeth. Its distribution extending as far north as S. Chekian is phytogeographically.

The Philippine O. bromeliifolia (Presl.) Copel. differs from the present species by teeth 2 or 3 times less deep and mostly simple veinlets.

7. Osmunda javanica Blume, Enum. 252, (1825); H.Bk. 426 (pt.); Christ 333 (pt.); H.Fl. 378; Matthew 375, (1911).

Plenasium javanicum Presl., 1848.

Fronds 30-60 cm. high or more, glabrous, simply pinnate. Barren segments linear or linear-lanceolate 15-25 cm. long, entire or more or less deeply serrate, cuneate at the base and often slightly stalked. Fertile pinnae shorter, occupying the center or rarely the base or summit of the frond, each pinna pinnatifid or almost pinnate, with numerous close but distinct globular or oblong sessile segments (or clusters of spore-cases). Texture coriaceous, rachis and both sides naked.

Widely spread over India, Archipelago, Borneo, Java, Sumatra, Formosa, Loochoo, Japan, Hongkong, China: Manchuria, Kwantung.
(F. 448).
8. Osmunda vachellii Hooker. Ic. Pl. t. 15, (1837); H.Fl. 379; Matthew 375, (1911).

Plenasium vachellii Presl., 1848.

Stipes 15-30 cm. high, stouter than in Osmunda banksiifolia; frond 40-90 cm. high; pinnae 10-15 cm. long rarely more, not quite one-tenth as broad, on stalks 35 mm. long, acute or acuminate, acute at base, subcoriaceous or coriaceous, entire or shallowly serrate with long, flat teeth; fertile pinnae reduced, pinnate with round or lobed pinnules, both entire and serrate pinnae can be found on the same plant.

Japan, China: Kwantung, Kiangsi.

Order IV. Salviniales

Aquatic, free-floating small or mud-inhabiting plants of various habit and vegetative structure, the leaves and their blades mostly small, filiform to roundish, entire, 2-lobed, or 2- or 4-foliolate. Spores in aggregates, the sori borne (1 to many) within special bony or membranous, globose to oblong-ovoid, stalked or subsessile sporocarps (conceptacles), spores of 2 kinds (plants heterosporous), archegonial prothallia developing mainly from megaspores and antheridial ones from the very numerous microspores. 2 families.

Key to families

I. Plants free floating; leaves small, with simple, entire or 2-lobed blades; sporocarps thin-walled, containing with megaspores or microspores....................Fam. X. Salviniaceae

I. Plants rooting in mud, with slender elongated rhizomes; leaves 4-foliolate, surmounting slender petiole; sporocarps with thick bony walls and containing both megaspores and microspores...Fam. XI. Marsileaceae

Family X. Salviniaceae Reichenb. Consp. 30. 1828.

Sporocarps (sori) very soft, thin walled, 20 or more on a common stalk, 1-celled and having a central often branched receptacle, which bears megasporangia containing a single megaspore, or microsporangia containing numerous microspores. The megaspores germinate into prothalia which bear archegones, the microspores into prothalia which bear antherides. Small floating plants, having a more or less elongated and sometimes branching axis, bearing apparently distichous leaves.

The family consists of two genera of interesting plants without close affinity of other groups. Leaves folded in the bud, simple or deeply 2-lobed, fertile leaves metamorphosed; rhizome elongated, provided with a single central stele.

2 Genera, Salvinia and Azolla, both represented in China.

Analytic Key to genera

1. Roots none, normal leaves not lobed.......84. Salvinia
1. Roots present, leaves lobed.................85. Azolla (p. 449).

84. Salvinia (Micheli, Nov. Gen. 107 t. 58); Adanson, Fam. d. Plant. 2. 15, (1753).

Type: Marsilea natans L.

Conceptacle globose, membraneous, indehiscent, monoicous, seated in clusters on short branches of the floating stem, 1-2 in each cluster, containing ten or more turbinate macrosporangia, each containing single macrospore; several of each cluster containing very numerous globose microsporangia, which are minute microspores. Succulent annual with slender floating stems, giving off shortly petioled or sessile fronds on the upper side and the short branches, that bear the conceptacles and much-branched feathered root-fibres downwards; fronds small, simple with a distinct midrib that runs from the base to the apex and close erect-patent secondary veinlets connected by a few arches; sporangia of both kinds borne on a much branched filamentous receptacle.

A genus of about 13 aquatic species widely dispersed all over the world; 1 recorded in China.

Salvinia natans (L.) All. Fl. Pedem. 2. 289, (1785); Baker, Handb. 135; Mett. 402; Matthew 390, (1911).

Marsilea natans L., 1753.
Salvinia europaea Desv., 1827.
Salvinia vulgare Dupr. 1845.
Salvinia verticillata Roxb., 1844.

Fronds oblong, horizontal, rounded or slightly cordate at the base, 9-12 mm. long, bright green on the upper surface with about 20 erecto-patent veinlets on each side of the midrib, each beset with 6-8 tufts of minute bristles, the under side thinly matted like the stem with shining brown pellucid hairs; conceptacles 4-8 in a cluster, the cells of thin walls regularly hexagonal.

Widely dispersed over the temperate regions of the northern Hemisphere, extending from the south of France to the plains of India, and China: Manchuria, Kansu, Chekiang, Anhwei, Hupeh, Szechwan.

85. Azolla Lamarck, Encycl. Meth. 1. 343, (1783).

Type: Azolla filiculoides Lam.

Conceptacle of two kinds, placed in the axils of the leaves of the same plant, both indehiscent, one larger, membranous, globose, containing numerous microspores, which are aggregated in massulae which are furnished with a membranous cuticle, and are borne on a branched filiform receptacle; the other kind smaller, ovoid, containing a single macrospore, which is crowned by few or many float-corpuscles, and has a calyptrate cap, which is pushed off as the archegonium develops. Fugaceous floating water-plants with copiously branched stems; leaves sessile, minute, densely imbricated, deeply-lobed, each lobe furnished with a midrib only; the stems sending out from the under side into the water copiously simple or feathered solitary or fascicled rootfibres.

Sp. 5, widely dispersed all over the world.

Azolla pinnata R. Br. Prod. Fl. N. Holl. 167, (1810); Flind. Voy. ii. 611, t. 10; Bak. Handb. 138; Matthew 391, (1911).

Root-fibres pendulous and conspicuously feathered; fronds oblong or deltoid, 1.2-25 cm. long, with numerous crowded primary branches,
(P. 450).
all simple or the largest with a few crowded branches towards the tip; leaf lobes firm in texture, red-brown, broad-ovate; macrospore crowned with numerous float-corpuscles, its cuticle finely granular, armed a few elevate papillae; massulae of microspores with only a few weak processes on one side. The type was recorded in Australia, with many varieties widely spread in tropic Asia and Africa.

Formosa, common in warm parts of China.

Family 41. Marsileaceae R. Br. Prodr. Fl. Nov. Holl. 1. 166, 1810.

Perennial slender plants growing in mud or in shallow water, having a slender creeping rhizomes. The leaves 4-foliate (or filiform, long-petiolated, circinate in vernations, sporocarps somewhat crustaceous several-celled, borne on peduncles which rise from the rhizome near the leaf-stalks or are more less consolidated with the latter and contain both megaspores and microspores. The megaspores germinate into prothallia which bear mostly archegonia, while microspores grow into prothallia bearing the antheridia.

3 genera and some 60 species of wide distribution, 1 from China.

86. Marsilea Linne, (1 Gen. 3. 794) Sp. Pl. 2: 1099 (1753).

Character of the family.

Marsilea quadrifolia L. Sp. Pl. 2: 1099 (1753); H. Fl. 412.

Rhizome wide-creeping under water; stipes 5-15 cm. long; leaflets obdeltoid, 15 mm. or less long, entire, outer side rounded, glabrous, pedicels in all 15-30 mm. long attached halfway more or less to the stipe forked above this and bearing 2 to 4 sporocarps; sporocarps 3-4 mm. long, round-oblong, pubescent, not bordered, with 2 minute basal teeth; sori 15 to 20 each sporocarp.

Europe to northern India, Japan, China.

A very common fern in rice field or swampy regions in central China.

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to

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